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## The Old and the New of Veterinary Science and Practice.*†

By Major-General Sir John Moore, K.C.M.G., C.B., F.R.C.V.S.

Having begun my profession in 1882, I presume I may be classed amongst the old of veterinary science, *au fait* with the old ideas and the old order of things; but I have tried to keep in touch with the new. Though we older people have the glories of our past as a solace in our declining years we look to younger generations to show us new ideas, new discoveries and to set up new milestones in the path of science. "*Tempora mutantur, nos et mutamur in illis.*"

For purposes of my address, it would perhaps be best to confine myself to the forty-six years of my own association with the profession: but, on reading some of our old books, one is attracted to the old conceptions of disease and methods of treatment that at the present day are sources of amusement. The veterinary surgeon of eighty years ago, in the heyday of horses, was certainly unique. If his deductions as to the causation of diseases were wide of the mark, he lacked nothing in dexterity and in heroic treatment on occasions. It has become proverbial that we can bury our mistakes or convert them into by-products.

In speaking of matters old and new, I cannot in this address cover the whole field of veterinary science. I therefore pick out a few instances under the headings of (*a*) medicine, (*b*) surgery, (*c*) teaching and research, (*d*) administration.

(*A.*) *Medicine.*—Few of us can remember in detail what we were taught in our college days. If, therefore, we turn to our textbooks to refresh our memories, as I have done in the preparation of this address, by reading in parts "The Principles and Practice of Veterinary Medicine" (1882 edition), by my old teacher, William Williams, we may receive rude shocks at the views expressed in those days as to causation of animal diseases. Yet Williams was a sound teacher, a great observer, a deep thinker, and an acknowledged authority considerably in advance of his time. The same may be said of our revered pioneers, George Fleming, William Dick, Professor Gamgee, William Percivall, Professor Coleman and others. Williams, for instance, in defining a contagious disease, says "it is a morbid condition of the animal body, induced generally by the operation of a specific virus, termed a poison, derived from an animal similarly diseased, and communicated either by inoculation, contact, or through the mediun of the air." He is quite right up to this point, but he continues: "Sometimes, however, contagious diseases originate spontaneously." He instances glanders and farcy, which he describes as "a malignant, contagious and fatal disease, due to the introduction into the animal economy, or of *generation within it*, of an animal poison, such generation being the result of degradation of tissue, consequent on the ravages of another disease." He thus affirms the spontaneous origin of glanders and farcy, and further adds that the latter form, farcy, is more frequently developed spontaneously than glanders. Youatt goes so far as to say that the glanders form is hereditary.

Fleming asserts that rabies is capable of spontaneous origin; Dick held that rabies always originated spontaneously. Williams disagrees with Dick on the word "always," and holds that the disease can appear independently of contagion, but admits that its propagation is mostly due to this cause. The circumstances of its spontaneity, however, he confesses are hidden in mystery. I mention these two diseases, as their complete disappearance from Great Britain is the best evidence against spontaneity of origin. The separation of the definite causative organism, *B. mallei*, the discovery of its wonderful and indispensable diagnostic product mallein, has sounded the knell of the terrible equine malady, glanders, and a fine mark of veterinary scientific progress has been made accordingly. Though matters in respect of rabies still remain hidden, present-day veterinary science and police exert a strangle-hold on it. As these two diseases have been eliminated from the field of the general practitioner in this country, a few words from one who has had general experience of them may be interesting.

During four years and a half assistantship in Manchester I had an unique experience of glanders in the cab and 'bus stables and in those of business firms. I think I can safely say I have seen every manifestation of the disease, even to an articular or synovial affection of the menisci of the stifle joints, and the colicky symptoms of splenic affection. I recall the grief of a cab proprietor who came to me in tears and begged me to clear out the disease from his premises, giving me permission to do anything I liked to them, which I did most thoroughly. It was then common to allude to the disease as acute and chronic glanders, acute and chronic farcy, cases of the latter at one time being allowed to work. Subsequently, "glanders" covered the whole, an appellation curious even in its pronunciation, but distinguished through its antiquity. I never could get away from glanders; in my first two years of service in India I had outbreaks in two batteries, two Indian cavalry regiments, and in ekka and gharry ponies of civil lines. The procedure in the Army in India in the early 'nineties was destruction of affected animals, removal of the unit from horse lines into picket outside cantonment, and constant inspection until four months after the last case. The unit was then declared free, and returned to troop lines. In one battery thirty-four horses out of one hundred and ten were destroyed, the disease having had a free run during my absence for six weeks on special duty. These were pre-mallein days. In the South African War (1899-1902), and on Remount Commissions in the United States, Canada, Austria and elsewhere, officers serving with the army experienced it, sometimes very badly,

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but were able to keep it in fairly satisfactory control with the use of the ordinary cervical method of mallein testing. During the late war, though we employed thousands of horses and mules, the disease gave little trouble, thanks to a most complete system of administrative and executive control, and the adoption of the intradermo-palpebral method of mallein testing, which could be applied and admit of the animal carrying out duty at the same time. The ability shown by the Veterinary Profession in the control of the animal diseases and in ministrations to sick and wounded during the war was a fine example of progress from the "old" to the "new" in veterinary science and practice.

In rabies, the veterinary surgeon was called in to destroy the rabid animal—a dangerous practice. My procedure, as a young man, was to present to the dog, over the half-door of the loose box, or from outside the enclosure, a pledgett of cotton-wool soaked with Scheele's prussic acid on the end of a stick. The animal usually grabbed it and fell: the remainder of the vial of prussic acid could then be poured into the mouth, gloves, of course, being worn.

Brain diseases of animals occupied much of the attention of the old practitioners and writers, and their views on phrenitis, sleepy staggers, mad staggers and stomach staggers are difficult to reconcile. Treatment was of the heroic order. Here is a specimen from Youatt on phrenitis.

> "Now is the surgeon's time, and his courage will be put to the test. He must open, if he can, one or both jugulars: but let him be on his guard, for the paroxsym will return with its former violence, and without the slightest warning. This is a case, and the only case, in which a ligature should be placed round the neck previously to the vein being opened; for, this being done, however soon the paroxysm of violence may return, a full abstraction of blood may confidently be relied on."

Blood-letting has its devotees to this day, not perhaps to the extent of eight quarts, but in certain circumstances general or local bleeding is indicated as advantageous; but gone are the fleams, single and composite, and the mallet. I almost had said that gone also are the large and repeated doses of physic administered by our forefathers, but after hearing Major Davenport, R.A.V.C., describe at the National Veterinary Medical Association Congress at Torquay, last year, administrations of explosive purgatives, I fancy there has been a return to the wisdom of the olden days.

The discovery by Davaine in 1863 of *B. anthracis* in the blood of animals suffering from splenic fever, the incubation of it outside the animal body by Koch in 1876, and the establishing of its pathogenicity by him, opened the way to brilliant discoveries which almost year by year have thrown more light on the cause and prevention of disease. The rods had been seen before 1863 by several scientists, including Davaine, in the blood of dead animals, and, designated as batonnets, were considered products of putrefaction, anthrax being considered a septicæmia or putrefaction of the blood. Williams is confused. He defines the disease as consisting in a special and primitive alteration in the blood in which an organism termed *B. anthracis* is rapidly developed and propagated; but adheres to an opinion that the disease is often produced by over-feeding, and he "is forced to the conclusion that the disease is due to a virus which renders the blood a fit habitat for this peculiar organism, between the spores of which and the virus there seems to be an almost indestructible affinity. He is unconvinced that "quarter ill" differs from anthrax, and "until further light is thrown upon the matter the disease will be described as anthrax with external manifestations."

Since then, however, research has given us information so precise that we can now make differential diagnoses in diseases formerly believed to be anthrax or symptomatic thereof.

Without doubt hæmorrhagic septicæmia and anthrax were greatly confused in India in days gone by; this leads me to a question to which I can get no definite reply—Is there any hæmorrhagic septicæmia in this country?

An expedient in preventive treatment of anthrax and symptomatic anthrax, practised before the days of preventive sera and vaccines, was to insert a seton in the dewlap. The old school was greatly impressed by its efficacy; the explanation given was that in inflammation, artifically produced or not, the coagulating properties of the blood are increased. In order to increase its action dressing the seton with a blistering ointment was recommended. Contrast this with handling of anthrax and other diseases under vaccine therapy.

Previous to the discovery of *B. tuberculosis* by Koch in 1882, the views expressed on the nature and causation of tuberculosis sound extraordinary in view of present knowledge, the means for its detection by tuberculin, and the possibility for its elimination from our herds under scheduled Acts and Orders. Old pathologists considered tubercle to be a new lymphoid growth resulting from hyperplasia of pre-existent adenoid tissue. Tubercle cells or corpuscles were described; the largest were termed "giant cells" with numerous nuclei and a bright nucleolus. Virchow maintained that tubercles were composed of a retrograde metamorphosis of physiological or morbid tissue elements, that a local process of inflammation led to an exudation of a material which became organised to some extent, and then died or shrivelled, forming a new growth or tubercle. He called the process "tuberculosis," and the name remains to-day. Williams, writing in 1882 before Koch's discovery, remarks that "whilst maintaining my opinion that tubercle is endogenous and due to the absorption of the caseous product of a preceding inflammation," adds, "the experiments to prove its contagiousness and even infectiousness do not go beyond this, namely, the introduction of degenerated products of disease into the body of a healthy animal." He says of the tuberculous masses termed by butchers "angle berries" or "grapes," "If we can only train our mind to consider that these masses are mere growths, that in fact they are no more injurious to the quality of the flesh than warts or excrescences on the skin, the feeling of fear may be overcome. I am of opinion that these excrescences are mere results of a previous and perhaps distant inflammation (i.e., capillary bronchitis, pleuro-pneumonia contagiosa, or other inflammatory disease); that the products of such inflammation are thus localised, whereby they are prevented from injuring the general economy; that, in fact, they are as much external to the general economy of the animal as so many excrescences in the skin or tumours in any part of the body; and that if they are carefully removed, and

the membranes and structures in which they are found and from which they grow, carefully dissected out, the flesh is perfectly good, fit for any man's table; and that it is a pity to destroy valuable and nutritious food because the term tuberculosis has been applied to the tumours."

Needless to say, Williams shaped his opinions in the subsequent years in accordance with the progress of his science, and I believe that if veterinary science as it now stands were properly applied, and the veterinary profession given a free hand, bovine and avian tuberculosis could be eliminated, and a mitigation of the scourge in human beings effected.

Bovine pleuro-pneumonia contagiosa, of which older members of the profession have had considerable experience, does not now exist in this country. Its suppression stands to the credit of administrative procedure in which veterinarians can claim a considerable share.

A paper on Progress in Veterinary Science and Practice would not be complete without reference to "milk fever." Rather than go into the syndrome complexity of this peculiar disease in milking cows, and the reasons assigned for their display, I will refer my audience to the valuable articles by Hugh Begg in the *Veterinary Journal*, September, 1928, and Professor Dryerre and Professor Russell Greig in the *Veterinary Record*, September 8, 1928. We had great faith in the ice and cold water pack, and in liquor ammonia fortior as a diffusible stimulant, in the practice of Mr. Richard Roberts, of Kendal, with whom I was a pupil in the early 'eighties. Contrast this with the later and more beneficent treatment by sedatives introduced by McConnell, of Wigtown, and the really dramatic results of udder inflation published in 1897, by J. Schmidt, of Kolding. The investigations of Professor Dryerre and Professor Russell Greig, the relationship of calcium deficiency in the etiology of the disease, the explanation of the value of mammary inflation in causing a sustained rise in blood-calcium, and, indeed, the whole evidence pointing to the adoption of calcium therapy in the prevention and cure of milk fever is a great step forward in veterinary scientific progress.

In many others diseases our progress over the past years has been made manifest. I will merely mention a few: the diseases of sheep due to microbial anærobes, the contagious abortions, canine distemper, fright disease, and others.

(*B.*) *Surgery.*—On the practical side perhaps no greater advance in veterinary science has been made than in surgery. Surgical interference is attempted now, particularly in canine practice, which never entered into the routine of the old practitioner. The preface to surgery, whether human or animal, is anæsthesia, general and local. Pre-chloroform days were barbaric; the law now demands insensibility to pain during major operations. I always associate the late Richard Roberts, of Kendal (afterwards of Tunbridge Wells), as the father of the use of chloroform in our profession. In the early 'eighties, he always performed castrations under chloroform, using an ordinary leather muzzle with towels round the top to prevent too great admixture of air, an important matter when dealing quickly with colts in an open field. The outcome of his procedure was a paper read at the Border Counties Veterinary Society on Chloroform, from which evolved the Carlisle pattern of muzzle. Other inhalers have been invented, and for general anæsthesia we now have complete and practical means both for large and for small animals, not forgetting the ostrich. Local anæsthesia from cocaine, eucaine, novocain, stovaine, hydrochloride of urea and quinine, and other synthetic compounds, is now a common procedure in veterinary practice.

Foremost in veterinary practice, at least in horses, is the ability to diagnose the seat of lameness and to prescribe rational treatment. The old practitioner was incomparable in detecting lameness. It was said of William Dick that he could tell at a glance, even when a horse had moved but a few yards, the seat and the cause from which he was lame. Has the young graduate of the present day the same ability? I doubt it. Here we may concede the palm to the older practitioner. There were many others as brilliant as Dick, and whose certificates of soundness were greatly respected and requested. Their treatments of lameness, too, were, on the whole, resourceful and practical, remembering that the horse was a creature intended for utility—and the majority of the actions of our predecessors, so far as lameness is concerned, hold good to this day. Firing and blistering for sprained tendons and ligaments, if looked at as a permanent bandage, strengthening a part, still may find favour. In the treatment of splint I still have faith in an incision by knife, or rowelling scissors, under the splint, separation of the skin and connective tissue over the splint, cutting through the periosteum into the osseous deposit with a sharp scalpel and keeping the wound open by means of a small length of tape, saturated with a mild counter-irritant, until pushed out in the healing process. Of course I presume local anæsthesia for the operation. For obstinate hip-joint lameness I would approve of an old fashioned remedy of two setons over the hip-joint as more successful in counter-irritation than mere blistering. It may sound barbaric, but it has proved efficacious.

Full advantage was taken by our officers of the fine field for surgery afforded by the large modern veterinary hospitals necessitated by the Great War. I am sure that much of the dexterity of our veterinary surgeons of to-day was developed by their war service.

Veterinary surgery has recently excelled itself in an operation for curing wind sucking in horses. The operation is formidable, but results have been satisfactory. One of the animals operated on won a prize in a mounted display at an Aldershot Horse Show. Major C. H. S. Townsend, R.A.V.C., Major W. M. Mitchell, Royal (Dick) Veterinary College, Edinburgh, and others, are to be congratulated on their achievements. The Hobday operation for roaring, too, is a triumph of veterinary skill of recent years. Of operations in the bovine subject, I wish especially to bring to notice the very daring, yet eminently successful, operations for traumatic pericarditis, by Major Leslie Pugh, recorded a year ago. Few of us older veterinarians would ever have dreamt that such an operation was successfully possible. Another operation in cows, but easy to accomplish, is the removal of a prolapsed uterus. I am inclined to believe that we preceded human surgery in hysterectomy.

Canine surgery during recent years has been brought to a high degree of perfection. Many of the operations in human practice have their counterpart in veterinary. To meet this advance, surgical appliances have been brought into line, and there now appears everything at hand, even

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to radiation, to render treatment worthy of scientific effort. Time will not permit me to remark on laparotomies, enterotomies for the removal of foreign bodies, hysterectomies, oöphorectomies, prolapses, tumours, amputations, and other operations.

(*C.*) *Teaching and Research.*—These are days of research, and teaching must be in conformity to it. Veterinary research is too wide to deal with here, except in skeletal form. It is not yet full grown, but it is the mainspring of our scientific success. It was, and is, beyond the old school of veterinary thought, but it is rightly the dream of the present and rising generations. One thing is quite certain: we shall never combat and defeat disease until we see the face of our enemy, and determine the strength of his sinews. We have done much; with good backing we can do more. There are many animal diseases whose causal agent still remains in obscurity, and until such are defined, preventive measures are haphazard and unscientific in application. One is sanguine, however, of ultimate discovery, and that in particular our old and elusive enemy —foot-and-mouth disease—will be arraigned before the Court of Veterinary Research carrying his own gibbet for his Tyburn. His arrest will confer a priceless boon on agriculturist and taxpayer alike.

It may be asked, When the causes of all diseases have been laid bare, what more will there be for the research worker? The reply to that is, There is no finality to research, and, in nature, insurgent diseases appear for us to attack, and other friendly police, or vitamins, anticipate acquaintance. The fascinating study of vitamins in recent years has made clear many factors in relation to health and sicknes that were ill-understood in former days of medical and veterinary science. Animal nutrition, animal physiology, and bio-chemistry in maintenance of animal health and treatment of disease are provinces which veterinary science has barely entered as yet, and I am clear that such subjects come more within the purview of veterinarians than that of any other body of scientists. These subjects should be made a solid basis of training at our schools with the object that we and future generations should be the acknowledged authorities in all matters concerning the preservation of the health of animals, and the mitigation or suppression of their ailments. At the same time, I agree with the first President of our Section (the late Sir Clifford Allbutt) that, in the elucidation of disease, team-work is necessary, and that the best results are likely to accrue from a trinity of veterinary, medical and plant pathologists.

(*D.*) *Administration.*—Forty-six years ago, when I entered the New Veterinary College, Edinburgh, the period of training for the Diploma of the Royal College of Veterinary Surgeons (M.R.C.V.S.) was three years, the Diploma of Fellowship (F.R.C.V.S.) being obtainable five years after. The training now is for four years and the Diploma of Fellowship is obtainable two years after. The Royal College of Veterinary Surgeons also confers a diploma for Veterinary State Medicine (D.V.S.M.) chiefly taken up by those who are in, or desire, State appointments.

Veterinary colleges, though receiving grants for initial erection, and annual grants from the State towards maintenance, are virtually private institutions. There is a feeling within the profession, and which I share, that affiliation of veterinary colleges to universities should replace the more or less indirect touch which exists at present in certain instances. Status would be improved and many aspects of training levelled up. Individuality, self-contained measures, and special training need not be interfered with thereby, but veterinary colleges would have a far better chance of progress if carried along in the swim of university organisation. We have lost ground by being a sort of Cinderella; the one-portal system of entry into the profession which is the safeguard of uniformity of qualification will not be broken by university affiliation.

The public support which is being extended to veterinary research, and the placing of it on an imperial basis, thereby enlarging the vision and the scope of the research worker, are great steps forward in the usefulness of veterinary science, and of public recognition. State veterinary service is gaining ground in public health administration; the hole-and-corner procedure is disappearing. It is we who must mend the position, and that we can do in every conceivable aspect of the special rôle we have elected to follow. "*Vis unita fortior.*"

## The Lords and The Protection of Animals Bill.

### A Curious Situation.

In the House of Lords on Thursday, December 6th, on the Order for the House being put into Committee on the Protection of Animals (Amendment) Bill,

Lord Desborough, speaking on behalf of the Government, said he desired to explain their position in relation to this Bill, in case, at future stages, silence on their part might be misinterpreted. On the occasion of the second reading he did his best to show that the Government were not enthusiastic for the Bill and that they really considered that its provisions were not of a workable character. Lord Banbury, who was in charge of the Bill, had had an interview with the Home Office, and he understood that the noble lord had not been successful in removing the objections which they entertained. If the Bill were carried, it would make a vast alteration in the law relating to dogs. No complaints had been received at the Home Office that section 3 of the Dogs Act had not worked satisfactorily. He desired to add that in the view of the Home Office the Bill could not be amended so as to make it a workable Act.

Earl Russell said the object of the Bill—to prevent a man who had been cruel to a dog from owning a dog in future and having the power to be cruel again—was one with which they so much sympathised that they gave the Bill a unanimous second reading. The House was told by the Government on the second reading, and had been told again that afternoon, that the Bill as it stood was hopeless, and that it could not possibly be allowed to come into force in its present shape. Lord Banbury had not put down any amendments to bring the Bill into harmony with the views of the Home Office, and it would be a waste of time, and it was hardly respectful, to ask their lordships to go on with a Bill which the Government had told them that the Department concerned thought was quite unworkable, and could not be brought into force. It would not be very respectful on the part of that House to send down to another place a Bill in a form which was admittedly unworkable. He, therefore, moved that the debate be adjourned.

Lord Banbury said he had had several interviews with the Home Office and the Parliamentary Secretary had told him that the Government would not oppose the Bill. The objection of the Home Office to the Bill was that it imposed a penalty which it might be difficult to carry out. The illustration given to him was that, in the event of a Court finding that a man had been cruel to a dog and

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## William Dick: Founder of the Royal (Dick) Veterinary College.*

By Alexander Miles, M.D., L.L.D., President, Royal College of Surgeons, Edinburgh.

I need scarcely tell you that I feel it a great honour that I should have been called upon to deliver this—the first—Founder's Lecture at the Royal (Dick) Veterinary College.

I am fully conscious that the compliment which this invitation implies, belongs in large part to the Royal College of Surgeons, over which I chance for the moment to preside. This reflection brings me comfort, for while I feel acutely my own limitations both as to right and as to capacity, I am willing to admit that *my* College may have some claim to the kindly consideration of *yours*.

The College of Surgeons has always had the most friendly relations with the Dick College, and is genuinely solicitous for its prosperity. I am sure it is a source of gratification to the College of Surgeons that its President should have the privilege of inaugurating what I sincerely trust will be a long series of Founder's Lectures.

Like myself, gentlemen, you may have asked why *this* year (1928) should have been chosen for inaugurating a Founder's Day and a Founder's Lecture. It is true we live in an age when centenaries, bi-centenaries, and centenaries to the *n*th are celebrated on the slightest provocation. But this is not the centenary of William Dick's birth, or of his death, or of the foundation of his College.

And yet there is a certain appropriateness that this year should have been chosen, for this is the centenary of the institution of Qualifying Examinations in Veterinary Science. The first public examination was held on the 23rd of April, 1828.

The circumstances under which we meet, leave me little scope in the choice of a subject on which to speak to you. The occasion limits me to two possibilities: I may deal with the rise and progress of your College; or with the life-story of William Dick, its founder.

Let me say at once that it is not my intention to attempt to sketch the history of this College. That has been done once and for all by your Principal in the "Historical Account," which he published in the Centenary Year of the College, and however freely I may borrow from that delightful record, I would not presume to embellish it, nor could I hope to emulate the charm of its literary style.

I shall therefore confine myself to some reflections on the life and work of the Founder.

As I take it, the purpose of a celebration such as this is two-fold. Its primary, and most important, purpose is to afford us an opportunity of paying homage to the memory of our Benefactor, and of reverently acknowledging our debt to him. It also furnishes a fitting occasion for considering the personal gifts and qualities, and the extraneous influences, that went to make him the man he was and enabled him to do the work he did. And if this inquiry is conducted aright, we shall surely be able to draw some lessons from the life he led, the ideals that inspired him, and the results of his efforts.

It was Thomas Carlyle who said that "the history of what man has accomplished in this world, is at bottom the history of the great men who have worked here."

Without indulging unduly in hero-worship, I think it may be said that in his own way, and in his, perhaps, limited sphere, William Dick was a great man: one whom "taken up in any way is profitable company."

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Sprung from the people, the son of a worthy father, he inherited the traditions of one of the oldest handicrafts of civilised man.

Born (in 1793), appropriately enough in the White Horse Close, at the foot of the Canongate and close by the Sanctuary of Holyrood (so named according to a pleasing tradition after a favourite white palfrey of Mary, Queen of Scots), in his father's forge he early developed an interest in animals; and throughout his life animals were to him not merely "stock," not merchandise to be bought and sold in the market place, but God's creatures to be cared for and tended.

With a desire for knowledge uncommon among his social compeers, he acquired, through his own efforts, a general education well above the average of the youth of his time.

With singleness of purpose he worked towards a goal he had set up for himself; and in the end he attained the object of his efforts and we to-day enjoy the fruits of his labour.

Unaided—indeed often in the face of opposition—he was the means of raising the craft of Farriery in Scotland to the rank of a recognised profession.

The Royal (Dick) Veterinary College is the visible and tangible product of his life-work.

To-day we stand uncovered to the name of William Dick.

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What were the attributes that went to the making of the man who did these things?

As I read his history what strikes me most forcibly about William Dick was his clear *sense of direction*. He knew where he was going; what he wanted to do; and

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forbidding him to hold a licence for such a period as the Court might decide, it would be possible for that man to get his wife, if he were married, or a servant, to take out a licence for the dog. His experience showed that it was by no means certain that a wife would, in these circumstances, do what she was asked to do by her husband. He might point out to the House, as he pointed out to Sir Vivian Henderson, that this Bill did not create a new offence, of which it might be quite impossible to convict people. It imposed a penalty, which was an entirely different thing, not in the hope that it would always be enforced, but that it would act as a deterrent. If the Bill were passed, it would be quite easy for the police to find out who had and who had not taken out a licence in their district and to enforce the Act. He hoped their lordships would allow that stage to pass in view of the Home Office having stated, on the day previously, that they did not intend to oppose the Bill. If the Home Office changed their mind before the third reading, it would be open to the House to take what course it thought proper at that later stage. In the meantime it could be definitely ascertained what attitude the Home Office were adopting towards the Bill.

The motion for the adjournment of the debate was agreed to.

*Address delivered at the Royal (Dick) Veterinary College, Edinburgh, on the occasion of the celebration of "Founder's Day," 20th November, 1928.

throughout life he kept the tenour of his way. Not always, be it said, the *even* tenour of his way, for he had sometimes to make a detour to overcome an obstacle, but having got round it he always came back to the straight track and followed it.

He was still in his teens when he recognised that the condition of farriery in Scotland was not satisfactory, and that something should be done to improve the training of those who followed his craft. Not, perhaps, an uncommon state of mind in youth. Young men (and for that matter, old men) often recognise that "something should be done." But for William Dick that was equivalent to saying "Let me try to do it."

To this end he began by improving his own education, and he attended, among other classes, those on mathematics and on rhetoric. Later he felt impelled to pass on his knowledge of veterinary science to others, and he began to deliver lectures; and after various ups and downs, within seven years he had developed a fairly comprehensive course of instruction in Veterinary Medicine and Surgery. From a report of the Highland Society we find that, in 1830, Mr. Dick's course included Anatomy, Physiology and Pathology in relation to the domestic animals; the surgical affections of the bones; the diseases of the foot, and the various methods of shoeing; operations for a variety of conditions; the medical affections of the lungs and the alimentary system; affections of the eye, ear and skin, and the infectious diseases.

The time seemed ripe for the establishment of a College of Veterinary Surgery in Edinburgh and Dick was active in advocating a scheme.

In 1823, on the suggestion of the University, the Highland Society undertook to stand sponsor for a public lecturer on Veterinary Surgery, but with characteristic Scots' caution, they limited their commitment to the sum of £50, and they were careful to stipulate "that the Society should be particular in the choice of the Lecturer."

This stipulation seems to have given the Directors no anxiety, for within a week William Dick had been appointed the Lecturer, and "furnished with a forge and other appendages for the practical instruction of country farriers," he began his "course of lectures on the diseases of horses, black cattle, sheep, and other domestic animals, illustrated by the necessary anatomical demonstrations."

During the first year the Society's grant of £50 was supplemented by an almost equal sum from students' fees. These lectures were delivered in his father's forge in Clyde Street, which remained the headquarters of the College till 1916, when it removed to the present buildings.

As time went on, to the forge were added a stable, a hospital, a dissecting room, a lecture room and a museum at a cost of £2,500, which was almost wholly borne by Dick himself. Before he died, in 1866, at the age of 73, he had accomplished the aim of his life, and had established in Scotland a school of Veterinary Science which has few equals and no superior. Yes, William Dick had a "sense of direction."

But a mere sense of direction will avail little unless it is accompanied by a will to *persevere* in following the course that is set, and Dick had perseverance. This might be illustrated by many incidents in his life, but in none more convincingly, I think, than by the way in which he persisted in his early attempts to establish a class of farriery in Edinburgh.

It was in 1818, when he was 25, that he returned from London, where he had obtained the Diploma of Veterinary Surgeon, after three months' study there. He at once set about laying the foundation for the working out of what he tells us was "a scheme which I have intently cherished in my mind"—namely, the establishment of a College in Edinburgh.

It chanced that at that time a certain Mr. Scott, of Parton, was starting a kind of "polytechnic" school in Edinburgh, in which a wide variety of subjects might be studied—ranging from music and painting to chemistry and veterinary science. William Dick undertook to conduct the class on veterinary surgery, but on the appointed night no students appeared.

The following year he tried again, and *four* members enrolled in the class, but of these, we are told, only one attended throughout the course. The other classes in the school do not appear to have been more successful, and Mr. Scott's venture collapsed in mid-term; but Dick, anxious to keep faith with his solitary pupil, hired a vacant shop in Nicolson Street, and completed his course there by the light of a penny candle. Nothing daunted, he announced a third course to be conducted on his own account in the Calton Convening Rooms, and he had *nine* pupils.

When the School of Arts was founded in the following year (1821), Dick offered to deliver a course of lectures without remuneration, and 17 farriers attended the class.

This course was repeated on the same terms the next year, with continued success.

In the end his perseverance was rewarded, for although his strenuous efforts for four years had brought him no financial gain, he had served his apprenticeship as a teacher, and had made such a reputation for himself, that, as we have seen, when the Highland Society decided to establish a public lectureship in veterinary surgery, their choice inevitably fell upon William Dick, and the scheme he had "intently cherished in his mind" was accomplished. To his "Sense of Direction" he added "Perseverance."

Another feature of Dick's character that strikes one in reading his history was his *self-reliance*. This, indeed, was imposed upon him by his circumstances in early life. His humble origin, his comparatively meagre school education, and the need to make his own way and earn a living, threw him back upon himself.

We have seen how he supplemented the instruction he had received from his school masters by private study in his spare time. Basing upon the traditions of the art of farriery that had been handed down to him by his father, he took up the systematic study of such books as he could obtain, and soon acquired familiarity with the current knowledge of the diseases of domestic animals and their treatment.

In the course of his daily work in the forge he made observations for himself, and if his own observations did not confirm the statements of the books—well, so much the worse for the books: which is as it should be.

He had no rich patron, or learned co.respondents, from whom he could find out what was being done in the London Veterinary College, of which he had heard, so he commissioned a bagman who was going to London to make enquiries for him, and it was on the reports received from the bagman that he set out in the " lang road coach " to take his Diploma ; not omitting to make his will before he started.

To obtain for himself experience as a teacher, if the rent of the Convening Rooms was beyond his means, he hired a vacant shop and bought a candle.

When he found that his course of instruction was incomplete without sick animals from which to demonstrate the signs and symptoms of disease and the methods of treatment, at his own cost he provided a hospital stable, where " pauper " patients could be treated without expense to their owners.

When the Highland Society took up his project, the *kudos* of being associated with the leading agricultural society in the country was of supreme importance to him, but none the less it was on Dick's shoulders that the burden of financing the movement fell, and he willingly bore it.

That William Dick had exceptional skill in veterinary surgery goes without saying. It is not for me to assess the value of his written works. That he was selected to contribute the article on Veterinary Art in the then current edition of the *Encyclopædia Britannica* sufficiently attests his authority ; and it is said that " he was a lucid and, did occasion require it, a trenchant writer." For 12 years he acted as one of the editors of *The Veterinarian* and was a frequent contributor to its pages.

I like to believe that story that " sitting in his room upstairs, he was able to diagnose the seat of lameness in a horse trotting in the street below." I know that there are others better able to judge of the truth of it than I am, who doubt it, but gentlemen, " There is aye some water whaur the stirkie droons," and for my part I intend to go on believing it.

On Dick's other qualities I need not dwell. He was a blunt, downright man who paid more attention to essentials than to frills, as would appear from a friendly, if somewhat candid, report made on his teaching premises by Mr. J. Castley, veterinary surgeon to the 12th Lancers. I quote one paragraph :—

" You may fancy to yourself," he says, " a room of no very great dimensions in an old and apparently long untenanted house in Clyde Street. You enter it from the street door, and are immediately struck with the delightful confusion which seems to reign within. Skeletons of all descriptions, ' from a child's shoe to a jack boot,' from a horse to an ape, not ranged ' in regular order all of a row,' but standing higgelty-piggelty, their ranks having been broken by the Professor's table, and their heads looking in all directions, as if thrown together by chance. Over the Professor's ' devoted head ' is seen suspended a portion of inflated and injected intestine, with its mesenteric expansion dangling in the air, something like a lure for flies ; whilst all around the room, and especially in the corners, are heaped together vast quantities of diseased bones and other preparations, seemingly without order, and without arrangement."

We can well imagine how these serried ranks of skeletons, all out of alignment and with heads looking in every direction, would shock the professional instincts of an officer of the 12th Lancers, but he was forced to confess, as he went on with his report, that " Of that part of the house which is set apart for the audience, the best thing I can say is that whenever I have dropped in, I have always found it *remarkably well filled*. It is fitted up with rough deal planks, set upon as rough props, the seats rising tier above tier, until your head touches the top of a very *dark coloured* ceiling."

Compare that, gentlemen, with these elegant oak-panelled halls of you pampered Georgians.

But this confusion was only in externals. As a teacher he was clear and lucid, if not eloquent ; and if he " showed no mercy to the idle," he " never failed to bestow kindly praise and encouragement whenever it was deserved."

These, then, where the outstanding qualities of this man William Dick : singleness of purpose, perseverance, self-reliance, simplicity, combined with shrewdness and generosity.

What were the circumstances and the extraneous influences that enabled him to use these qualities towards the accomplishment of the end he ever had in view ?

If a man is the product of his times, we must consider the period into which he was born in assessing his life-work. The end of the 18th century, when Dick was born, was a period of great intellectual activity, and during the formative period of his life a man of his type of mind could not escape the spirit of the times

In Scotland it was a time of " low living and high thinking," and the thinking man's mind was directed by such men as Hume, with his " Essays," and his " History of England " ; Principal Robertson, with his " History of Scotland " ; Smith's " Wealth of Nations " ; and Gibbon's " Roman Empire."

The poems of Allan Ramsay, of Robert Fergusson and of Robert Burns were read in every household. Walter Scott's poems appeared while Dick was still a lad, and the Novels began to appear when he was a young man.

In the scientific world there had been a great outcrop of new " theories," on which were based new " systems." Linnæus and Buffon had given a fresh orientation to biological thought ; the work of Cavendish, Lavoisier, Galvani, Fahrenheit, Joseph Black and James Watt, among others, had opened up great vistas in Physics and Chemistry.

In Medicine, also, new ideas and wider conceptions were springing up under the stimulus of Haller and Hales in physiology ; of Albinus, Scarpa and the Monros in Anatomy ; of Wolff in Embryology ; and of John Abernethy, Cheselden, Percival Polt, the Bells, and a great French School, in Surgery.

John Hunter, and his brother William, had demonstrated, what the student of to-day has still to learn, that Clinical Medicine and Surgery is merely the application of Anatomy, Physiology and Pathology to the problems of the sick and hurt. The study of morbid anatomy in the *post-mortem* room had made it necessary for physicians to revise many of their most cherished ideas.

Auenbrugger had demonstrated the value of immediate percussion as an aid to diagnosis. Morgagni correlated

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clinical symptoms with pathological lesions. Jenner proved the value of preventive inoculation. William Cullen here in Edinburgh systematised the teaching of medicine, and was the first to deliver his lectures in the vernacular and not in Latin.

Into this ferment of evolutionary, and even revolutionary, thought, William Dick was thrown when he set out on his life work as a veterinarian. Something, however, was wanted to canalise his mind, and to direct his efforts into the proper channels to effect his already well-defined purpose. That influence came into his life when one day he walked into the classroom of John Barclay, the Lecturer on Anatomy at Surgeons' Square. Principal Bradley tells us that this visit "was momentous in the life of William Dick and in the history of Veterinary Science in Scotland."

. . . . . .

### John Barclay.

Let us see, then, what manner of man this John Barclay was, and how his character and his talents helped to mould the destiny of your Founder.

The son of a farmer at Cairn in Perthshire, he was educated at the parish school of Muthill, and, we are told, early distinguished himself by his "application." Originally destined for the Church, he studied at St. Andrew's, and prepared his "trial discourse," which had to be delivered in the Hall preparatory to his being admitted to the Ministry. By way of a dress rehearsal for this ordeal, he read his discourse to his uncle, who interrupted him to point out that the doctrine he was announcing was contrary to the teaching of the Apostle Paul. Barclay presumed to argue his case, but when he quoted Xenophon in support of his views, it was more than the old man could stand, and he seized a huge folio that lay on the table, and hurled it at the preacher's head. Fortunately, his aim was not so straight as his theology, or we might have lost John Barclay, and, who knows, perhaps even William Dick. On such small things may history depend.

(It is interesting, in passing, to notice that Barclay had been attracted to Xenophon among the ancient philosophers, for you will remember (or perhaps you won't) that Xenophon was "a member of an *equestrian* family of the deme of Erchia." He wrote essays on horsemanship and hunting, and he gives rules how to choose a horse, and tells how it is to be groomed and ridden and generally managed.)

The Presbytery of Dunkeld seemed to take a broader view than the uncle, for the discourse was sustained and Barclay obtained his licence to preach.

To eke out his slender resources as a young minister, he followed a common custom of those days by becoming tutor in the family of a local magnate. He was entrusted with the education of the two sons of Sir James Campbell, of Aberruchill, but it would appear that he did not confine his attention *exclusively* to these members of the family, for in 1811 he carried off their sister, Eleonora, as his bride.

In the course of his tutorial duties he accompanied his pupils to Edinburgh, and although he occasionally preached from the pulpits of his friends he seems gradually to have abandoned the idea of devoting his life to the ministry.

It is not clear how he was attracted to medicine, but it is on record that the prelections of Cullen, Gregory, and particularly of the second of the Monro dynasty of anatomists, exerted such a powerful influence on him that he completed a course of medical study and graduated M.D. at the age of 37.

Barclay's interest lay chiefly in the philosophical study of anatomy. In competition with such brilliant exponents of anatomy as the second Monro, and John Bell, he began to lecture on the subject in a small room in the High School Yards, then the site of the Surgeons' Hall, and the centre of medical teaching in Edinburgh. His classes at first were small, but he persevered, and by scrupulous care in the preparation of his lectures, and by cultivating a clear and perspicuous style, he became a most popular lecturer. It is said that "at a time when it was by no means fashionable, he never omitted to point out the wisdom of God, as displayed in the most wonderful of all his works, the formation and support of the human body."

Among his pupils was William Dick, who seems to have attracted his favourable notice, to the discomfiture of some of the medical students, who drew Barclay's attention to the fact that Dick was only a common working blacksmith. "Well, well," said Barclay, "all I can say is that whether he be a blacksmith or a whitesmith, he is the cleverest chap among you."

We are not concerned here to follow Barclay's career as a teacher of *human* anatomy. The point of interest at the moment is that he was one of the first to direct attention to the importance of *comparative* anatomy, both as a scientific and a practical branch of study, and to correlate the structure of the human body with that of other creatures. He devised a system of anatomical nomenclature that was applicable to all subjects—human and other—and which greatly simplified the study of anatomy alike for students of human and of veterinary anatomy. He delivered several courses of lectures on comparative anatomy, and at one time petitioned the Town Council, then the Patrons of the University, to be created a Professor of that subject, but nothing came of that project.

It is recorded that at one time he became possessed of the body of a *Beluga*, or white whale. "Never shall we forget," says an eye-witness, "the enthusiasm of the doctor, wading to his knees among the viscera of the great tenant of the deep, alternately cutting away with his large and dexterous knife, and regaling his nostrils with copious infusions of snuff, while he pointed out, in his usual felicitous manner, the various contrasts or agreements of the forms of the viscera with those of other animals and of man."

The narrator omits to mention that Barclay was devoid of the sense of taste or of smell. This physiological defect will be envied by those of us who are old enough to remember the days when Sir William Turner (a very good friend of this College) was similarly engaged on the carcass of a whale in the court behind the Anatomical Rooms at Teviot Place, during a long hot summer session in the late 'eighties.

Barclay was beloved by his pupils on account of his affability and his kindness. Many young men of good promise but meagre means had their fees remitted by him

and he even paid the fees for their other classes to help them on.

He died in 1825, and was buried at Restalrig. His bust, by Hope, has an honoured place in the College of Surgeons.

It is not difficult to realise how such a man exerted a helpful influence on a youth like William Dick. They had many points in common: "application," courage, enthusiasm, long (as well as broad vision), generosity; and they remained life-long friends.

. . . . . .

But, gentlemen, there was another, and a very potent influence guiding William Dick's life. The French have a saying, when they want to get to the root of anything: "*Cherchez la femme*," and when we search for the woman in this case we discover Mary Dick.

There is little left on record of Mary Dick's activities, for she knew "what every woman knows," that she could most effectively exert her influence on mere man from behind the scenes.

We have to fall back on the beautiful sketch of her character that Principal Bradley gives us in his "Historical Account" of the College. It is too long to quote in full here, and it would not be fair to pluck the gems from their setting. Enough to say that from childhood's days, with all a sister's affection, Mary was the guiding star of her brother's life. In his home life she mothered him; in his early struggles she encouraged and supported him; in his business affairs (if I may use the word) she "audited" him; and in College affairs she inspired and directed him. She was the personal friend and adviser of all the students; and, be it added, the dispenser of justice to those who fell from grace. You have only to look on her portrait to realise what that meant; but it is said her justice was ever tempered with mercy.

She died in 1883, at Burntisland, at the age of 92, and was buried by the side of her brother in the New Calton burying ground.

. . . . . .

I hope I have justified my belief that William Dick was one of the great men who "taken up in any way is profitable company."

In any case, I have said enough to show that he was no ordinary man, and his qualities may well serve as a model for you who are preparing to follow the profession which he did so much to create and which he so richly adorned.

Make up your mind what you want to do with your life; persevere in the pursuit of your object; rely upon your own efforts; lose no opportunity of acquiring *skill* in your profession; be just, and be generous in all your dealings, and you will do honour to the memory of William Dick, and bring credit to the College which he founded.

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ROYAL COLLEGE OF VETERINARY SURGEONS.

D.V.S.M. EXAMINATION.

At the Examination held in Edinburgh for the Diploma of Veterinary State Medicine on the 6th December, 1928, the following candidates were declared successful:—

S. R. J. Cussen and J. McKellar.

FRED BULLOCK,
*Secretary.*

## "Colonial Veterinary Services Behindhand."

Mr. Ormsby-Gore, M.P., Parliamentary Under-Secretary for the Colonies, speaking on "Developments and Opportunities in the Colonial Empire" at a public meeting arranged by the Association of Scientific Workers and held at University College last week, said that among the great tasks of the Colonial Office were the application of science to the problems of agricultural production, public health, and education. The vast majority of appointments to the higher grades in the Colonial services were made by selection by machinery set up to advise the Secretary of State. The Crown Agents for the Colonies advised the Secretary of State on all appointments required for the Government railways, for the public works departments (mainly architects, engineers, etc.), for marine appointments, telegraph engineers, wireless operators, dispensers, sanitary inspectors, European non-commissioned officers for police, and European police-constables, etc.

Recruiting and selection for the remaining services were carried out through the staff of appointments secretaries at 2 Richmond Terrace, Whitehall. These services were filled by men who were not required to undergo any special or competitive examination; candidates were in the main selected on the basis of their complete school and university records. They consisted of administrative officers, mostly for East and West Africa; educational officers for the whole Colonial Empire; financial—*i.e.*, audit, treasury and customs; legal; medical; veterinary; agricultural; forestry; scientific specialists; survey; geological; game wardenships, etc.

Speaking of the type and qualifications of the men required, Mr. Ormsby-Gore said it could be taken that the Colonial Office would continue to require about 100 new men each year, appointed through the selection machinery of the appointment secretaries, for the political and administrative staff. On the other hand, in scientific appointments the increase had been very rapid. The number of educational appointments had grown from 19 in 1913 to 65 last year, and in many ways this was the service that was growing most rapidly. The number of medical officers appointed each year had increased in the same period from 67 to 121; in fact, it was reckoned now that they would require more doctors each year than any other category appointed by the Secretary of State.

The number of agricultural officers had risen from 11 to 42, and to this last figure must be added a further 15 agricultural scholarships. He regretted to say that the veterinary services were still much behindhand. They appointed seven in 1913 and only nine in 1927. In the whole Colonial Empire they had at the present moment only 127 veterinary officers, including specialists, yet there were something like 10,000,000 head of cattle, besides other domestic animals.

After explaining the scheme of the Colonial Office for agricultural scholarships, Mr. Ormsby-Gore said that the bulk of the agricultural officers required nowadays were people during whose training emphasis had been laid upon the biological sciences. There would probably be a slow increase in the number of soil scientists in the coming years, particularly those who had some biological knowledge as well as purely chemical qualifications. Above all, they would require an increasing flow of plant geneticists for the development of new and higher-yielding varieties of all the various tropical crops. What Java had done for the sugar cane must be done for all the tropical crops.

Quite apart from the need of scientific workers, whose main bias had been on the biological side, he could not emphasise too much the need of a biological outlook in all officers who were henceforth going to take part in the harnessing of our tropical resources. Just as industry here in Europe needed mainly chemists and physicists to solve the problems of progress, so the tropics needed biologists of every kind. Even in the strictly medical field it was not merely the medical practitioner who was wanted in the tropics, but the protozoologists, the bacteriologists, the bio-chemists, and the immunologists.

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## The Physiology of Milk Fever. II.*†

By Pierre A. Fish, Ithaca, N.Y., Cornell University.

### Hypoglycæmia and Normal Blood Sugar Standards.

In a former paper[1] attention was called to *data* which seemed to controvert the theory of a reduced amount of sugar in the blood (hypoglycæmia) as the causative factor of milk fever, as advocated by Widmark and Carlens,[2] Auger[3] and others. Additional *data* by Hayden[4] and by Moussu[5] strengthen the evidence against a hypoglycæmia.

The necessity for a normal working standard for the sugar in the blood is self-evident; some confusion has already resulted from the use of different standards. The range in human and canine blood has been given as 80 to 120 milligrams of glucose per 100 c.c. of blood. That of bovines is less. Widmark and Carlens and Auger give 80 mg. per 100 as the standard for dry cows and 60 mg. per 100 for milk cows. Moussu, with a group of eleven animals (3 oxen, 3 dry cows and 5 cows in milk), obtained an average of 61 mg. per 100. Hayden and Sholl,[6] using the Folin-Wu method, obtained an average of 51·75 mg. per 100. Their average was determined as a result of 75 examinations from 44 cows. They were "good specimens in so far as metabolism and general physical condition are concerned." Most of the animals were in milk, but a few in the dry condition were included in the average.

A standard obtained by averaging the results from a group of animals, taken at a given time, has an undoubted value; but it is believed that a more reliable standard can be obtained by continuing the examinations for a long period of time (a year) and obtaining the average amount for the period. We are following this plan with a monthly blood-test on a group of five cows. Four were pregnant when the experiment began; three were in milk and two were dry. After an approximate six-month period (October to June), three produced calves, and the fourth calf was born two months later. The fifth cow was not bred until December, and is now in the pregnant condition. After ten months of the experiment, the average of 48 individual tests gives 45·52 mg. of sugar per 100 c.c. of blood. The maximum obtained in any one animal was 70 mg., taken on the day the calf was born, and the minimum 30 mg.

This average and that obtained by Hayden are noticeably lower than those given by the European investigators. In general, it would appear that the amount of blood sugar in the bovines is about one-half that of man or dog. We believe that a range of 40 mg. to 60 mg. per 100 is a reliable standard for the average normal cow. Although sugar is one of the most important constituents of the blood, it is not apparently confined to narrow limits as to its amount. Auger, in agreement with Widmark and Carlens, believes that reduction of the blood sugar below 40 mg. or 30 mg. causes hypoglycæmic disturbances. We have found, in apparently normal cows, the blood sugar as low as 30 mg., without evidence of this disturbance.

### Amount of Blood Sugar in Dry Cows and Milk Cows.

Widmark and Carlens, examining heifers and dry cows, obtained an average of 80 mg. per 100; in milk cows the average was 60 mg. per 100. The lower average in the latter was supposed to be due to the using up of the glucose of the blood by the udder in manufacturing lactose. Auger agrees with the above figures. In our experiment the two dry cows gave an average, during the dry period, of 44·89 mg. per 100 (av. 14 tests) and two cows in milk, an average of 46·68 mg. per 100 (av. 20 tests). Moussu's *data* show an average of 56 mg. per 100 for three dry cows, an average of 53·2 mg. per 100 for three males (oxen); and for three cows (pregnant) in milk 71·5 mg. per 100 and two cows (non-pregnant) in milk 64·2 mg. per 100. In our experiment four of the cows were pregnant when the experiment began and the fifth became so three months later.

It is realised that *data* from a larger number of animals are desirable, but it is nevertheless significant that independent groups of workers, contrary to the findings of Widmark and Carlens, find in the jugular blood a slightly greater amount of sugar in the milk cows than in the dry cows.

### Influence of Pregnancy upon the Amount of Blood Sugar.

Although there may be conditions associated with a normal course of pregnancy which cause the amount of blood sugar to fluctuate, it is believed that they cause transitory rather than continuous changes. Monthly examinations of the sugar for six months in two cows, prior to calving, showed an average of 47·5 mg. per 100; examinations for three months after calving gave an

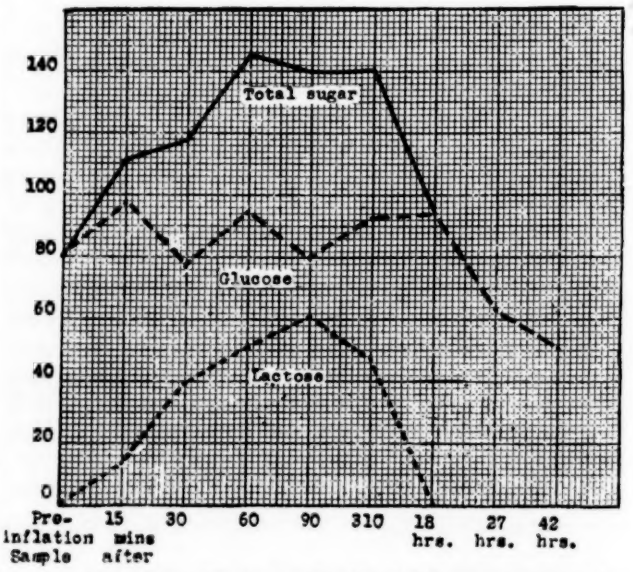


Fig. 1. (Case 9.) The curve for the total sugar represents the results as ordinarily obtained by the Folin-Wu test. After the fermentation method has been applied, the glucose disappears and the lactose remains. The Folin-Wu method is again applied to determine its amount. The glucose curve is determined by subtracting the lactose from the total sugar. Note that the pre-inflation sample of blood contains no lactose; but after inflation the lactose is quite markedly increased and has disappeared within 18 hours.

* Presented at the sixty-fourth annual meeting of the American Veterinary Medical Association, Philadelphia, Pa., September 13-16, 1927. Reprinted from the *Journal of the American Veterinary Medical Association*, Vol. LXXIII, N. S. 26, No. 1, May, 1928, pp. 10-38.

† The first paper was reproduced in the issue of the *Veterinary Record* of January 7, 1928 (No. 1, Vol. VIII.)

average of 46·7 mg. per 100. Diet and, perhaps, seasonal conditions are probably more important factors in regulating the sugar supply of the blood. A study of the sugar curve of the five cows shows that, during the ten-month period, the amount of sugar fluctuated very little during October, November and December. There was a uniform decrease in sugar during January and February, an increase in March, a decrease in April, a rise for May and June, and a decline in July. The curves are suggestive of seasonal changes, as the animals were kept under the same conditions. They were in pasture from about May 20th to November 1st, and received a small amount of grain and hay in addition. From November to May they were stabled and allowed access to a paddock for exercise, and received a larger proportion of grain and hay than during the summer months. In all of our tests the blood was taken from the jugular vein and tested by the Benedict reagent with the Folin-Wu filtrate.

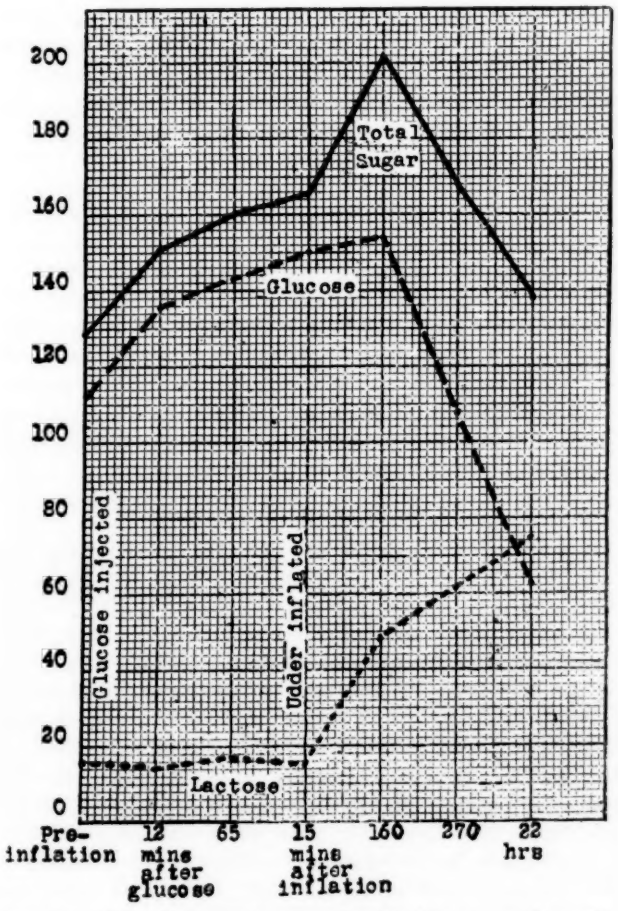


FIG. 2. (Case 10.) This case of milk fever was the only one in our series which showed the presence of lactose in the blood before the udder was inflated (lactocæmia). Immediately after the pre-inflation sample of blood was taken, 20 grams of glucose were injected into the jugular vein. The udder was not inflated until 90 minutes later. Note that during this period the amount of lactose remained practically unchanged, while the amount of glucose increased, probably as a result of the injection. After the udder was inflated there was a marked rise of the lactose in the blood and but little change in the glucose until the third hour, after which it decreased and was approaching normal at the 22nd hour.

### AMOUNT OF BLOOD SUGAR BEFORE AND AFTER UDDER INFLATION.

We have been able to confirm, on milk-fever cases, the observations of Widmark and Carlens on *healthy* cows, that inflation of the udder increases the amount of sugar in the blood. We have also been able to confirm their hypothesis that this increase is due to the absorption of lactose from the mammary gland. In the former papers of Fish[1] and of Hayden,[4] the method of Folin and Svedberg for differentiating between glucose and lactose in the blood by the process of fermentation has been described. Two of the cases were referred to in Fish's paper and five additional ones were reported by Hayden. Out of a total of seventeen cases to date, the method has been applied to seven and we believe the results are reliable. In only one (case 10) of the seven cases, was any lactose found in the blood before the udder was inflated, and this small amount was considerably increased after inflation. In this case the udder was considerably distended with milk before treatment was given, and it may be assumed that lactose absorption had been going on before the pre-inflation test was made. In the six other cases there was no evidence of lactose in the blood until after the udder had been inflated. It usually appeared within fifteen minutes and the amount varied with individual cows.

Our tests have also enabled us to show that the increase of sugar after inflation is not due entirely to the absorption of lactose (lactocæmia). There is also a minor increase of glucose (glycæmia). In cases 6 and 9 our *data* were

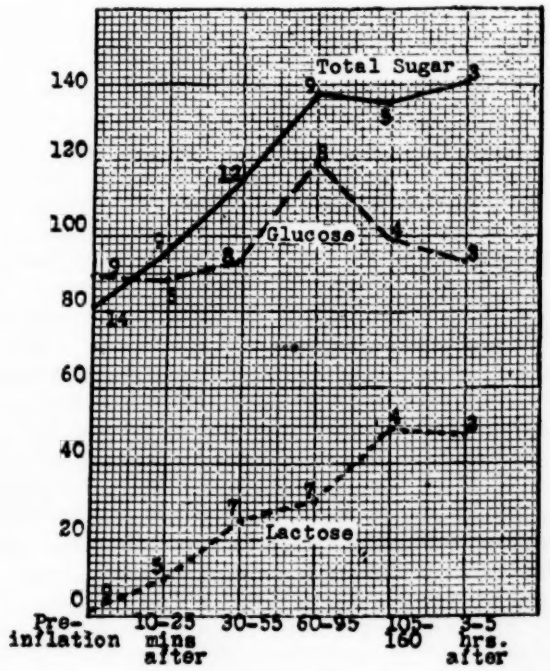


FIG. 3. (Averages.) This chart represents the averages of the sugar determinations. There were no pre-inflation samples from three cases. The lactose determinations were not made on the first five cases. In some cases only one or two lactose tests were made. The figures along the curves represent the number of cases from which the average was made. The curves indicate that the glucose reaches its maximum in 1 to 1½ hours and the lactose in 2 to 4 hours.

complete enough to show that in the former, as compared with the pre-inflation sugar (glucose), the average increase of the total sugar for 60 minutes was due to an increase of 84·5 per cent. of lactose and 16·1 per cent. of glucose. In the latter (case 9), over a period of 310 minutes, there was an average increase of 83·3 per cent. of lactose and 15·9 per cent. of glucose. Whether or not this percentage is constant, we have not as yet sufficient *data* to show. This minor increase in the percentage of glucose after inflation is perhaps accounted for by the fact that the gland is temporarily defunctionised and the glucose that had hitherto been used in the production of lactose has now an opportunity to accumulate in the blood. In some cases it was not infrequently found that the post-inflation glucose occasionally dropped to a lower level than the pre-inflation glucose—there was more or less fluctuation. Udder inflation of dry animals has no effect upon the sugar content of the blood, according to Auger. He inflated the udder of a three-year-old dry goat, making sugar tests before and after inflation, and found that neither hyperglycæmia nor glycosuria appeared.

There seems to be considerable variation in the return of the glucose and lactose to their normal levels in the blood after inflation. In case 6, after one and three-quarter hours, the glucose had fallen to 42·7 mg. (normal limit), but the lactose was still high (32 mg.), although receding. In case 8, after 17 hours, no lactose was found, but the glucose was high (103 mg.). In case 9 the lactose had disappeared within 17 hours but the glucose was still high (93·2 mg.). At the 46th hour it was normal (51·3 mg.). In case 10, after 23 hours the glucose was approaching normal (62 mg.) but the lactose was the highest of our readings (75 mg.). This cow had received an intravenous injection of 20 grams of glucose. In case 13, after four hours the glucose and lactose were both high, 79·2 mg. and 35 mg., respectively.

The amount of sugar present in the blood, when treatment is begun, has a very direct bearing on the hypoglycæmic theory. In this connection also it is obvious that a normal standard for comparison is of importance. Widmark's standard of 60 mg. per 100, Moussu's of 61 mg. per 100, Hayden and Sholl's of 51·75 mg. per 100, and our recent average of 45·52 mg. per 100 for a ten-month period show fairly wide variations.

In the fourteen cases of milk fever reported by Hayden and Sholl, they found that the average amount of sugar present in the "first samples" was 99·42 mg. per 100. In Hayden's later report[4] of fourteen additional cases, the "first samples" showed an average of 94·45 mg. per 100. Unpublished *data* by Little and Keith,[9] on five cases of milk fever in which the blood samples were taken before udder inflation, showed an average of 93·2 mg. per 100. Moussu reports the average for five cases "before treatment" as 62·6 mg. per 100. The average of fourteen of our recent cases "before treatment" was 81·5 mg. per 100. In connection with our average it is interesting to note that the sugar readings were relatively low in all the cases occurring between October 6th, 1926, and January 24th, 1927, the average of 8, "before treatment," being 64·5 mg. per 100, agreeing quite closely with Moussu's average. The minimum was 45 mg. and the maximum 80 mg. From January 27th to May 26th, the readings were higher, giving an average of 104·1 mg.; the minimum being 80 mg. and the maximum 127·8 mg. It is hoped in the course of time that enough *data* may be obtained to determine if such a marked difference may be due to seasonal conditions.

The "first samples" referred to in Hayden's papers were taken just after the udder had been inflated and this perhaps explains why his figures are higher than those obtained by Moussu and by us in our later series "before treatment." It is difficult to construe the above *data* with a condition of hypoglycæmia in milk fever.

Auger states that Widmark and Carlens, experimenting on eight subjects (cows and goats), found a sugar increase, after inflation of the udder, with a maximum at 40 to 60 minutes and a rather rapid return to normal at about the ninetieth minute. Presumably these figures refer to healthy animals. In a number of our milk fever cases the sugar did not return to its normal level until after a number of hours, and in one case not until the second day.

To illustrate the increased amount of blood sugar following udder inflation, we have taken the average of twelve cases when the sugar was at its maximum (30 to 60 minutes after inflation) and find it to be 133·14 mg. per 100, an increase of 63·1 per cent. over the *pre-inflation* (before treatment) sugar. About 84 per cent. of this increase appears to be due to the absorption of lactose into the blood. Reckoning from a normal standard of blood sugar at 51·75 mg. per 100, the total increase would be 157·27 per cent. The greatest amount of total sugar found in the blood of individual cases occurred in cases 10 and 14. Both of these animals had received injections of glucose. Case 10 received 200 c.c. of a 10 per cent. glucose solution (20 grams of glucose). Four hours after the injection the Folin-Wu test gave 202·2 mg. per 100. Case 14 received an injection of 6 ounces of glucose in one quart of water (180 grams to 1 litre) and about one hour later the test showed 312·2 mg. of sugar per 100 c.c. of blood. These figures are probably far above the "renal threshold" and a marked glycosuria might be expected.

### The Glucose Treatment.

The injection of glucose solutions for curative purposes was evidently devised in connection with the hypoglycæmic theory, for the purpose of restoring the normal amount of sugar to the blood and tissues. In a true hypoglycæmia such a treatment is most logical and proper. If the blood sugar, however, is normal or higher than normal, as the figures of Moussu and ourselves show, such treatment would not, apparently, be indicated. Moussu applied the glucose treatment to three cows without apparent benefit. In the first cow he injected 30 grams of glucose subcutaneously. As there was no change in the symptoms in two hours, the udder was inflated and the patient recovered in four hours. In cow 2, the same amount of glucose was injected subcutaneously. There was no change in six hours. The udder was then inflated and the cow was standing in three hours. In cow 3, twenty grams of glucose were injected intravenously. There was no change during 17 hours. A second injection of forty grams was given subcutaneously. There was no improvement and the animal was sacrificed.

In our case 10, 200 c.c. of a 10 per cent. solution (20 grams) of glucose were injected in the jugular vein. As there were no observable changes after one and one-half hours, the udder was inflated and improvement followed.

Some reports have been made from various parts of this country in connection with the use of a commercial preparation in which the dosage is six ounces of glucose to a quart of water (180 grams per litre), intravenously administered. The reports are variable, some claiming favourable effects and others obtaining no benefit. In our own clinic this treatment has been used in two or three cases *after* the udder had been inflated. Apparently there has been no detriment and possibly some slight advantage.

In Widmark and Carlens' original paper,[2] reference is made to the curative effect of glucose injections. They report its use in four cases. A sterilised 5 per cent. solution of glucose was injected intravenously (jugular or mammary veins) to the extent of three to five litres. This would mean the use of from 150 grams to 250 grams of actual glucose. One cow was in coma ; in another, no coma was present ; another was nearly unconscious and the fourth was unable to rise but at times was able to raise her head. In each case after the injection the cow was on her feet in an hour or less. After another hour the udder was inflated as they were unable to guarantee that the favourable effect of the injection would be lasting.

In comparing this method with the others previously mentioned, the outstanding difference is the larger bulk of the solution used, and in some instances a greater amount of glucose. It is estimated that there are about 15 grams of glucose in the total blood of the average cow and on this basis a dose of 20 grams would seem reasonable. On the other hand, an excessive amount of glucose in the blood would not necessarily be serious, as the excess, not used by the tissues, would pass over into the urine. The difference in results may be associated with the difference in the bulk of the solutions used as well as the glucose content. Approximately, the average cow may be considered to contain about 30 litres of blood in its body. The injection of 3 to 5 litres of fluid into the blood means an increase of 10 to 17 per cent. of its volume, and this may reasonably be expected to have a general stimulating effect, not only on the circulation itself but on some of the eliminating channels as well.

### Intravenous Injection of Normal Saline.

In connection with the effect of increasing the volume of the blood, we carried out an experiment on a normal Guernsey cow, December 28th, 1926, using 4 litres (1 gallon of normal (0·9 per cent.) physiological saline solution (NaCl.). The cow was giving only three quarts of milk at the time, and was milked once a day. The period of injection covered two hours. A small amount of the solution was lost in the process, but we are sure that 3½ litres, or a little more, got into the circulation. The cow urinated and defæcated a number of times during the experiment, and it was noted that the fæces were more fluid than normal. Apparently both kidneys and bowel were stimulated to greater activity.

A sample of blood was taken before the injection and gave a sugar reading of 49·1 mg. per 100. Rather to our surprise, it was found that four later samples, taken during the period of injection, showed an increased amount of sugar as follows: 1 hour, 71·7 mg. ; 1¼ hours, 67·9 mg. ; 1½ hours, 87 mg. ; 1⅔ hours, 83·6 mg. ; and 4¾ hours from the beginning of the experiment a return to normal, 45·1 mg. The 1½-hour amount of sugar (87 mg.) represents an increase of 77 per cent. above the initial reading, an increase equal to that found in a number of our cases of milk fever. The injection represented the introduction of about 36 grams of sodium chloride into the blood, but we have no knowledge that this salt has any glycogenic function and doubt that it is directly concerned in the production of sugar. Being an isotonic solution, the saline solution offers no insult to the blood, whereas pure water in this amount, if injected rapidly, might produce hæmolysis. Slow injection, especially of a large quantity of fluid, is desirable, as there is a possible danger of dilation of the right ventricle if too rapidly introduced.

In a case of milk fever, the stimulation of the kidneys and bowel, as indicated in our experiment, ought to be a favourable factor ; furthermore, the exchange of fluid to and from the blood and tissues, washing out the latter and probably promoting the process of oxidation, are additional favourable considerations, and may assist in explaining the curative effects reported by Widmark and Carlens. A 5 per cent. solution of sugar is likewise an isotonic solution ; but, aside from this quality, it is not impossible that the glucose introduced may serve a purpose in connection with the oxidation processes following the stimulating action of the increased volume of blood.

Three samples of urine were also collected from this cow, each of which gave reduction tests indicating the presence of sugar. Unfortunately no urine sample was obtained before the experiment was begun.

### The Effect of Udder Inflation upon Blood-pressure.

Seitter,[8] experimenting upon normal animals (goats and cows), induced a lower blood-pressure by the use of chloral hydrate and amyl nitrite. A Riva-Rocci apparatus was used in determining the blood-pressure. In the goats the normal blood-pressure, at the femoral artery, ranged from 196·7 to 211 m.m. Hg. In the cows he found a pressure in the coccygeal artery ranging from 193·7 to 203·8 m.m. Hg. A goat with a normal pressure of 206·2 m.m. and a temperature of 39° C. was given 5 grams of chloral hydrate per os, and in half an hour showed complete narcosis. The pressure had fallen to 156·5 m.m. and the temperature to 38·5° C. The udder was now inflated and a half-hour after the inflation the pressure had risen to 181·3 m.m. and the temperature to 38·9° C. Three and one-half hours after udder inflation, both pressure and temperature had returned to normal. The same goat was used again five days later ; this time without udder inflation —as a control experiment—the same amount of chloral hydrate being given. The initial pressure was 211 m.m. Hg. and the temperature 38·9° C. After narcosis the pressure fell to 158 m.m. and the temperature to 38° C. The blood-pressure and temperature gradually rose as the animal recovered, and reached normal six hours after the administration of the chloral. Udder inflation caused a return to normal pressure and temperature two hours earlier than by natural recovery.

Similar experiments were tried upon another goat and a cow with similar results. In the cow, inflation brought a return to normal in three hours ; in the control experiment the normal pressure and temperature was not reached

until seven hours. *Data* are wanting relative to such experiments upon actual cases of milk fever, but clinical evidence points to a condition of low blood-pressure. Three factors in the experiments show an analogy to the conditions found in numerous cases of milk fever: unconsciousness (coma), low blood-pressure and subnormal temperature. All of these are apparently improved by the simple inflation of the udder, and it seems reasonable to assume that inflation will produce results in milk fever cases similar to those in the experiment animals.

### Urinary Ammonia.

In Bulletin 160, Kentucky Agricultural Experiment Station, February, 1912, Healy and Kastle[10] point out analogies common to milk fever and eclampsia. Parturition is believed to be the most important factor. Quoting Hess (Schw. A., 1905) it is stated that "in 170 cases he did not observe it (milk fever) during, nor preceding, labour, nor did he observe it later than 96 hours following labour." Exceptionally, however, cases have been reported, by others, before calving and also later than the 96-hour period.

These authors devoted especial attention to the urine. As a result of 100 examinations of the urine of the dairy cow, covering a period of three winter months and three summer months, they have established the following as a normal standard.

*Colour*: Colourless to deep yellow, clear, either no precipitate or a slight flocculent, or granular, and occasionally a heavy white, precipitate of calcium sulphate or triple phosphates.

*Reaction*: Alkaline, neutral or amphoteric.

*Specific gravity*: 1·014.

*Hippuric acid*: 1·17%.

*Ammonia*: 0·0009%.

*Urea*: 1·06%.

*Total nitrogen*: 0·58%.

*Albumen and sugar*: Absent.

*Microscopical*: Crystals of calcium sulphate, calcium oxalate, triple phosphates, ammonium urate, amorphous urates, squamous epithelial cells and irregular vegetable cells.

The urine from three cases of milk fever showed albumin present in all. The total nitrogen was increased; hippuric acid, decreased; urea, increased; ammonia, markedly increased. Hyaline, granular and a few epithelial casts and leucocytes were present.

The authors believe that the disease is due to a toxin elaborated in the udder, as the result of its own metabolism preceding normal milk-production, and that the success of the modern treatment is due to preventing, by means of pressure, the absorption of this toxin seems most highly probable.

If a mammary toxin is the causative agent, it may be assumed that milking out the udder would bring relief; but this procedure, according to others, favours the onset of milk fever.

Their evidence is based, in part, on the injection of the colostrum from milk fever cases into the abdominal cavity of guinea-pigs. Ten c.c. of the colostrum was used, and death usually resulted in five or six days. The *post-mortems* revealed acute parenchymatous nephritis with interstitial hæmorrhages, acute parenchymatous hepatitis with interstitial hæmorrhages, acute degeneration of the cells of the adrenal cortex, with complete destruction of the medullary cells, and interstitial hæmorrhages. Five c.c. of colostrum from healthy cows or of fresh milk similarly injected into guinea-pigs, although causing some reaction, did not cause fatal results.

In analysing their *data* it is found that in two of their cases the ammonia content of the urine was forty times above normal; the other case showed only a trace. In one of our cases (13) an ammonia determination revealed its presence to the extent of 0·028 per cent., which is fairly close to their determinations: 0·037 and 0·035 per cent., and much higher than the normal content of 0·0009 per cent.

Horvath[11] found that injections of ammonia (or urease) into rabbits caused a rise in the content of the glucose of the blood. This is suggestive in connection with the presence of ammonia in cases of milk fever, and may have a bearing on the increased amount of the glucose found in the blood of such cases.

### The Nitrogenous Constituents of the Blood.

Hayden[15] seems to have been the first to have noted, in addition to a hyperglycæmia, a changed nitrogenous condition of the blood in milk fever cases as compared with the normal. The *data* on blood findings in Table I, slightly revised, are taken from his work. Hayden states:

> An average of the first samples of blood taken in milk fever indicates a rather marked hyperglycæmia. The second set of samples which are taken after treatment (at intervals sufficient that the animals had shown recovery from the attack) still shows hyperglycæmia, but there is quite a marked decrease in the sugar content of the blood after udder inflation.
>
> There is an increase in total non-protein nitrogen in both sets of samples. The average for the second set is higher than that of the first. There is an increase in the urea in both sets, but in this case the first shows the greater increase. Urea is a part of the total non-protein nitrogen, and it makes up a larger portion of the non-protein nitrogen in milk fever than it does in the normal animal.

Table I.—*Averages of blood analyses (mg. per 100 c.c. of blood), after Hayden.*

| | Sugar | Total Non-Protein Nitrogen | Urea | Uric Acid | Creatinine | Chlorides |
|---|---|---|---|---|---|---|
| Normal (Average of 75 tests) | 51·75 | 30·11 | 11·18 | 2·06 | 1·37 | 516·1 |
| 1st samples milk fever (Average of 27 tests) | 95·82 | 37·34 | 17·02 | 2·25 | 1·31 | 472·7 |
| 2nd samples, after treatment (Average of 9 tests) | 68·44 | 38·24 | 14·04 | 2·19 | 1·11 | 515·62 |

It is of interest to note that the non-protein nitrogen and urea still remain high after the apparent recovery of the patient. Although both of these constituents show higher readings than the normal, the proportion of urea in the non-protein nitrogen has returned to normal, *i.e.*, in the normal urea comprised 37 per cent. of the non-protein

nitrogen and in the " second samples " 36·7 per cent. In the " first samples " it is 45·5 per cent.

The urea of the " first samples " is 52·2 per cent. higher than the urea of the normal animals and in the " second samples " is still 25·5 per cent. higher. The total non-protein nitrogen of the " first samples " shows an increase of 24 per cent. and of the " second samples " 27 per cent. increase over the normal. The creatinine shows a decrease of 4·3 per cent. in the " first " and of 19 per cent. in the "second" samples. The chlorides show some decrease in the first samples, and the uric acid 9·2 per cent. in the " first " and 6·3 per cent. increase in the " second " samples. It would appear that even after the apparent recovery of the animal, there is, nevertheless, a delayed recovery of the nitrogenous metabolism.

### The Endocrine System.

It is now quite well established that, in one way or another, the pancreas (insulin), adrenals, thyroid and pituitary glands contribute directly or indirectly to the equilibrium of the sugar supply in the body. They may, therefore, be more or less involved in the altered glucose content in the blood of milk fever cases.

Recently attention has been directed toward another group of endocrine glands—the parathyroids, which may have a more direct relation as a causative factor in milk fever. It is generally accepted that the parathyroids are concerned with, or regulate, the calcium metabolism of the body. Another function attributed to them, but not so frequently mentioned, is the regulation of the amount of the nitrogenous substance known as guanidin.

Halliburton[12] states : " When we remember that the creatine of muscle is methylguanidin acetic acid we see where guanidin originates, and in bringing about the destruction of this substance the parathyroids exercise a controlling influence on muscular metabolism and maintain muscular tone." According to Paton and Orr,[13] guanidin (CNH) $(NH_2)_2$ is a near ally of urea CO $(NH_2)_2$.

Dryerre and Greig[14] suggest certain symptoms observed in milk fever analogous to those seen in animals deprived of their parathyroids, or those in which a parathyroid deficiency exists, particularly with reference to the guanidin function.

Among the typical signs of guanidin poisoning they refer to : preliminary excitement, dilation of the pupil, increased irritability of the neuro-muscular mechanism, giving rise to muscular tremors and spasms, interference with gait and finally collapse. There is a lessened sensibility of the sensory nerves, abolition of the swallowing and coughing reflexes, an accelerated pulse due to a lowered tone of the cadio-inhibitory fibres, cessation of defœcation and micturition, due to the depressing action upon the sympathetic system, while the toxic effects of guanidin upon the secretory activities of the kidneys result in the suppression of urine. The arrestment of the involution of the uterus and the lowered blood-pressure could be accounted for by the concentration of the guanidin being sufficient to paralyse all plain muscle.

The relationship of the adrenal glands to the sympathetic system is well known ; and evidence indicates that the circulation of adrenalin, in sufficient amount, in the blood stream plays an important rôle in the rate of oxidation in the tissues. If the supply of adrenalin is subnormal, there will be a lessened destruction of the toxins which, in connection with a parathyroid deficiency, increases the toxæmia.

They believe that inflation of the udder causes pressure sufficient to develop stimuli strong enough to stimulate reflexly the outflow of adrenalin, and this may hasten the normal processes of oxidation.

Disturbance of the calcium metabolism is not lost sight of. This may act concurrently with adrenalin deficiency. Calcium is a normal constituent of colostrum and milk, and through this channel the normal amount in the body may be reduced. Inflation, by checking the secretion of milk, will conserve the supply of calcium in the blood. With an increased amount of adrenalin, oxidation is hastened, the toxins are burnt up and blood-pressure is raised. Their hypothesis includes numerous points of physiological interest, and experimental work bearing on some of these points with their results is promised later.

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(*To be continued*).

XUM

**The Veterinary Record**
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## THE OLD AND THE NEW OF VETERINARY SCIENCE AND PRACTICE.

Although our eyes must be ever to the future, it is sometimes very helpful to look back upon the past to see the path we have trodden and perhaps profit by the mistakes there revealed.

Sir John Moore, in his paper read to the Comparative Section of the Royal Society of Medicine, compared the present state of Veterinary Science with that of about forty or fifty years ago, and those of us who can remember some of that period will say that he has drawn a very fair picture of the conditions and knowledge prevailing about that time. It must, however, be remembered that the science of Bacteriology was then but in its infancy and both veterinarians and medical men were labouring under this disability.

It is surprising how near the truth some of the old writers got and how accurate their observations were. Although we perhaps pride ourselves on our superior knowledge, the practitioners of that period would, in many instances, compare very favourably in their skill in the manipulation of animals in obstetrics and in their powers of accurate diagnosis of lameness with the veterinary surgeon of to-day, and we must see to it that we do not lose that skill by reason of the extra aids that science has given us.

Some of the methods of treatment prevail to the present day, *e.g.*, firing for sprains and exostoses of various sorts, but with this difference, that now these operations are carried out with the aid of an anæsthetic, either local or general, with which our forebears were not blessed.

Veterinary Science has made very great strides in the last decade, thanks to the advances in Pathology and Bacteriology. Such diseases as black quarter, anthrax, contagious abortion, swine fever, swine erysipelas, lamb diseases, and now distemper, to mention only a few, can be prevented or controlled.

Vaccines and sera are constantly being employed for the domesticated animals, even more, perhaps, than for the human subject, and the incidence of such diseases as tetanus has diminished enormously owing to the routine use of preventive sera.

With the increase in value and number of our pedigree herds, together with the production of milk on a larger scale, the economic importance of sterility, in cows especially, is being recognised, and the method of treatment for these conditions has now been put on a scientific basis and is being constantly practised, while the operation of grafting has been resorted to with great success.

It is probably in Canine Surgery, however, that the greatest strides have been made; whereas in human surgery the general practitioner hands over his surgical cases to the specialist, in veterinary surgery the practitioner performs all sorts of difficult operations on his canine patients without the slightest compunction. In this connection one cannot overlook the pioneer work of Professor Hobday.

Research in animal diseases on a large scale is comparatively a new field. Although we have been fortunate in the past in having such able workers as Sir John M'Fadyean and the late Sir Stewart Stockman, until recently the facilities for carrying out investigations were very meagre. To-day several Institutions are devoting themselves wholeheartedly to research, with splendid results.

A number of young veterinary surgeons are being trained in this special branch of Veterinary Science, enabling them to fill the posts which are being opened out for them in our Colonies and Research Institutions. It is to be hoped that before long funds will be available for research in Physiology, Animal Nutrition and Bacteriology for our graduates.

Education has not fallen behind. The standard of preliminary education for our graduates is equal to that of the medical profession, while the curriculum is being constantly added to and revised. Even now, a Committee of the Royal College of Veterinary Surgeons is considering this matter and it may possibly find that four years will not be sufficient to teach all that is required.

A closer liaison is being formed with the Universities, and Degrees in Veterinary Science are granted by many of them. Whether some of our Colleges shall become part of the great Universities is a matter that is being carefully considered at the present time. Although there appear to be some difficulties in the way, it is considered by many that it would improve the status of our profession.

Lastly, we are pleased to observe the *rapprochement* that has taken place between the Medical and Veterinary Professions, which has been fostered by the formation of the Comparative Section of the Royal Society of Medicine, the Chairman for the year being Sir John Moore. This is deserving of our full support.

### League of Nations Sub-Committee.

### Lieut.-Colonel Reid representing New Zealand.

Lieut.-Colonel H. A. Reid, O.B.E., F.R.C.V.S., F.R.S.E., D.V.H., who represents New Zealand on the International Committee on Epizootic Diseases, has been invited by the Secretary General of the League of Nations to attend meetings of the sub-committee of experts on veterinary questions, at which questions regarding the inspection of meat for exportation will be discussed. Colonel Reid has accepted the appointment.

The sub-committee of experts is a branch of the Economic Committee of the League, set up as a result of a recommendation of the Conference for the Abolition of Import and Export Prohibitions and Restrictions. The terms of reference of the sub-committee are to consider what guarantees might be given by countries that export livestock, and what facilities might be granted by importing countries on the basis of these guarantees, and to determine in general the best methods for applying veterinary supervision, taking into account the economic interests of the exporting countries and without prejudice to the interests of countries desiring to take precautions against diseases of animals.

# CLINICAL AND CASE REPORTS.

## So-called "Uncoupled" Cows.

The following method of dealing with this condition was recently described at a meeting of the Derbyshire Division by Mr. H. McINTYRE, M.R.C.V.S., of Leek.

Mr. McIntyre said that he thought these animals were seldom treated—it was usual to send them at once to the butcher. However, he had found that a large proportion of these cases were really those of hip dislocation at the head of the femur, and he had had considerable success in treating them.

There was the usual history of splits—one or both legs would go right away from the cow. The luxation was usually backward and outward. He had never succeeded in reducing a forward luxation. The condition could be felt by palpation.

His method was to put the cow on her side with the affected leg uppermost. A five gallon beer barrel, or, failing that, an empty milk churn, was then placed high up between the legs. A strong rope was looped above the hock of the affected leg and then looped again below the hock. Three strong men now pulled on the rope with a gradually increasing pull (a lever pull with the beer barrel as the fulcrum) downwards to the ground; at the same time the operator pushed the head of the femur forward.

As soon as the dislocation was corrected (the ball returning to the socket with a click) the cow would rise herself, but if the dislocation recurred after re-placement recovery was not hopeful. The majority of cases went on well.

Mr. McIntyre said that this operation was not successful in cases of subluxation when there was the tearing of ligament and muscles not infrequently seen in heifers at difficult calvings. In cases amenable to treatment, when the animal was on its side the affected leg would stick upwards; in the unsatisfactory cases it would hang limply down.

In answer to a question Mr. McIntyre said he had not had the same good results in treating dislocated shoulder, but he had never known a true dislocated shoulder without a fracture.

## Bacillus Necrophorus Infection among Goats.*

By Captain RAYMOND RANDALL, U.S. Army Veterinary Corps.

Some time ago the writer was called upon to examine three goats (kids) that had died en route while being brought to the laboratory. The owner stated that he had about 900 goats and 300 kids at his ranch, and that the kids were dying at the rate of twenty to thirty daily from some unknown cause. From the owner's statement it appeared that the only marked symptom was a sore mouth, and that the affected animals only lasted four or five days. It also appeared that there was only the one infected ranch in the locality, and that there was no history of a previous outbreak.

A three weeks' kid was selected for autopsy. The body was found to be emaciated, the mouth was covered with saliva, and necrotic areas were found in the skin near the rectum. The feet and legs were normal. On opening the mouth it was noted that the gums were ulcerated to such an extent that the incisor teeth were loose in the sockets; that a croupous membrane of a dirty grey colour covered the mucous membrane of the pharynx; and that necrotic areas were distributed over the tongue and hard palate. The odour from the mouth was similar to that of rancid cheese. Aside from the lesions noted above, two abscesses were found in the liver.

Blood from the heart was examined for bacteria and found negative, while material from the ulcers of the mouth and abscesses of the liver were positive for *Bacillus necrophorus*.

In two other animals examined the disease was limited to the oral cavity, while the skin of the feet was normal in each of the three animals examined.

Upon being further questioned, the ranchman stated that the goats had been closely penned up for several months, thus affording ample opportunity for infection if the soil was contaminated. Since *Bacillus necrophorus* must enter through a break in the skin or membrane, it appears probable that the kids in question were infected through the broken mucous membrane of the mouth as new teeth were erupted.

The *Bacillus necrophorus* is strictly anærobic and does not form spores or capsules. It is generally found in manure or manure-contaminated soil, and is a relatively normal inhabitant of the alimentary tract of certain animals. In this way an active state is maintained. This organism is of special importance in veterinary practice because of its wide distribution, and because it is the causative agent of necrotic stomatitis in cattle, foot rot or lip and leg ulceration in sheep, necrobacillosis of cattle and hogs, and dermatitis gangrenosa in horses.

TREATMENT.—No specific prophylactic or curative vaccine has been perfected. Excellent results may be obtained in the treatment of dermatitis gangrene in horses by the use of acetic acid. A one to one and one-half per cent. acetic acid solution, or a fifty per cent. solution of ordinary vinegar gives good results.

*Reproduced from Vol. XXI., No. 8, U.S. Army *Veterinary Bulletin*.

## Can a Dog have Distemper more than Once?

JUDGE ACCEPTS VIEW THAT NO DOG IS IMMUNE.

WEYBRIDGE PLAINTIFF LOSES.

"The question 'Can a dog have distemper more than once?' was" says the *Surrey Comet* of November 17th, "argued for several hours in Kingston County Court on Tuesday, and so conflicting were the opinions of those occupying high places in the veterinary world that Judge Harington, because of this confusion, postponed judgment.

"The action concerning which there was so much dispute was brought by Mr. E. T. Neathercoat, Gower House, St. George's Hill, Weybridge, and he claimed £98 1s. 6d. from Miss E. J. Hindley, Nutwood, Betchworth, as damages for the loss of two dogs, a golden retriever, alleged to have died from distemper, and a St. Bernard dog.

"Viscount Erleigh, barrister, appeared for plaintiff and defendant was represented by Mr. H. O'Hagan, barrister.

"Plaintiff said the keystone of his case was that he was told the retriever (a puppy) was over distemper, and that it died from it. He described the symptoms, which developed very rapidly, shown by the retriever, and said he had always understood that a dog could only have distemper once. The puppy began to ail the day after arrival on March 8, and he wrote to that effect to defendant on April 2. The puppy died the next day. Later the two dogs previously at his house had distemper, and one, a St. Bernard, the value of which was about £70, died.

"Mr. A. Payne, F.R.C.V.S., Weybridge, said that when he first saw the retriever, on April 2, it had typical symptoms of distemper and meningitis. It was removed to his hospital, and died the following day. No dog could have distemper twice, unless it was a recrudescence of the first attack, which might follow at an interval of a month or more. On April 15 he was called in to see the St. Bernard, which also had typical symptoms of distemper, and also died on the following day. A Great Dane also became affected, but, under treatment for suppressed distemper, recovery was made. The St. Bernard puppy was a very rare specimen, and at its death would have been worth from £60 to £70. In cross-examination Mr. Payne said the incubation of the disease would be from three days to three weeks, and twenty-one days would be quite a usual time. He agreed that in his profession there was formerly a divergence of opinion as to a dog having distemper twice, but it was now generally accepted as being incorrect, unless through recrudescence.

"Professor Hobday, F.R.C.V.S., who spoke with forty years' experience, confirmed the value of the St. Bernard as being about £70. It was not impossible for a dog to have distemper twice, but in his own career he had never come across it.

"This closed the case for plaintiff.

"Defendant said in her dog-breeding she was particularly interested in golden retrievers. She had an inquiry from plaintiff, and, not having one at that time, obtained a puppy from Saffron Walden, which was stated to have had distemper. Plaintiff went to see it at her kennels, and the first thing he said was that it must be over distemper. The puppy, he thought, was thin-looking and frail, and witness told him that was probably due to distemper, and pointed out it was with her only on approval. It appeared to be quite well when it went to plaintiff. In cross-examination she agreed that plaintiff was most insistent as to the dog having had distemper because of the other dogs at his place.

"Miss Bell, Saffron Walden, the breeder of the puppy, said its registration with the Kennel Club showed birth on September 29. Early in November it had distemper, but was fully recovered when it was sent to the previous witness.

"This was confirmed by Mrs. Konworthy, another breeder.

"Mr. Henry Gray, M.R.C.V.S., who had 43 years' experience, and for 38 years has had a canine hospital, said there could be distemper after a period of nine or ten years, and a dog might have four attacks and then die. In cross-examination he said it was a common public opinion that dogs could have distemper only once, but that was not supported by those who studied facts.

"Judge Harington asked witness how far back extended the belief that distemper was recurring, the reply being a hundred years.

"The Judge said he was greatly puzzled by the divergence of opinion on this subject, Professor Gray replying that no period of time could alter facts.

"Mr. Wilkinson, the veterinary surgeon who had treated the retriever puppy at Saffron Walden last November, said a recurrence of distemper might be in a different form, and the period of immunity would vary in that case.

"After hearing counsel, his Honour said he would reserve judgment. It was an interesting case, and of importance to both parties, particularly to defendant. He would like to say with regard to defendant, whether he found she was liable or not she had been placed in a very unfortunate position, and had acted in a perfectly straightforward way. She had given her evidence with much frankness. Why he wanted time to consider his judgment was because of the extraordinary conflict of evidence between veterinary surgeons, and the opinions they had given as to the origin from which infection might be caused.

JUDGMENT.

The same paper thus records, after his review of the circumstances of the case, Judge Harington's judgment, given on 30th November:—

"The first question, said the Judge, was as to whether a warranty was given regarding the retriever puppy. He thought there was no doubt that there was. It was an essential condition of contract of sale that the dog which was sold to the defendant had had distemper. That was frankly admitted by the defendant. Then as to whether there had been a breach of that warranty: the veterinary surgeon who had given evidence on behalf of the plaintiff stated that a dog could not have distemper more than once and that therefore, if this dog had already had distemper, it was over distemper and immune from a recurrence of the disease.

"But according to the evidence by other veterinary surgeons, evidence which he would accept, no dog was immune from distemper. Plaintiff's case was that the dog he had bought had not had distemper, and was in fact suffering from distemper in a suppressed form on the day it was delivered to him. There was a remarkable conflict of evidence. It was stated that this particular dog was one of a litter born on September 29 of that year, and that all the puppies of the litter, including this one, developed distemper at the beginning of November. They were attacked by open distemper, but under treatment they recovered, and this particular puppy was quite well before Christmas. The puppy remained thin, but it was apparently quite well by the time it was sold to plaintiff. The question was whether it had been proved by plaintiff that the dog had never recovered from the November attack and was still suffering from suppressed distemper at the time it was sold. The veterinary surgeon who had attended the dog with distemper in an acute form was of opinion that a dog could not have distemper more than once. Therefore, if it had had distemper in the previous November, it could never have recovered but continued to be affected with suppressed distemper. He was supported in that view by Professor Hobday, who was of opinion that a dog could not have distemper more than once, but having regard to the evidence of Mr. Henry Gray and Mr. Wilkinson, the former being a leading authority on the disease, he could not accept the view that a dog after having had the disease once could not have it again. Mr. Gray was very emphatic about the matter, as he had known many dogs having had distemper several times at varying intervals. The evidence was that a dog would completely recover from an attack after five or six weeks at the outside. He thought that there could be no doubt that this dog had an open attack of distemper at the beginning of November, and therefore in the ordinary course would have recovered before Christmas. But the dog had apparently completely recovered by that time. Therefore it followed that it could not have suffered from distemper in a suppressed form for over two months from Christmas to March.

"'I have come to the conclusion,' added His Honour, 'that taking all the facts into consideration, and bearing in mind that the onus is on the plaintiff to establish that there was a breach of the warranty given by the defendant that the dog had had distemper, I would not be justified in accepting the statement made by her as untrue, and that the dog had not recovered from the original attack of distemper in November and was still affected when it was sold. Although I sympathise with the plaintiff in his misfortune, I do not think that he can hold defendant liable for it.'

"Judgment was given for the defendant with costs."

# ABSTRACTS.

## Milk Fever.

The Edinburgh theory of milk fever, enunciated by Dryerre and Greig, which postulates that the disease is due to parathyroid disability, with a consequent deficiency in the blood calcium, receives further support in the work of Sjollema (*Biochemische Zeitschrift*: 1928. P. 300 to 308).

Chemical analyses of blood were made in 40 cases of milk fever, and these were controlled by determinations in 8 normal parturient cows and in 12 normal non-parturient, lactating cows.

No abnormality in the milk fever bloods was noted except in the case of calcium and inorganic phosphoric acid.

Taking the normal average of blood calcium as from 9 to 11 mg. per cent., Sjollema finds in 40 cases of milk fever:—17 cases with less than 5 mg. calcium per cent.; 16 cases with from 5 to 6 mg. calcium per cent.; 6 cases with from 6 to 7 mg. calcium per cent., and 1 case 7.3 mg. calcium per cent.

He also mentioned one case (although not included in his tables) in which the calcium was 9 mg. per cent. In normal cows the calcium figure was never disturbed.

These figures show a remarkable similarity when compared with the recently-published findings of Dryerre and Greig.

The inorganic phosphoric acid was generally low, although in 10 cases it was practically normal, and in one case it was high.

The magnesium and potassium figures were normal.

The alkali reserve and the hydrogen-ion-concentration were practically unchanged, and it is concluded that in milk fever the acid base equilibrium is slightly, if ever, disturbed.

In a few urea estimations there appeared to be a tendency towards increase.

Acetone was sometimes present, but this substance may occur in the blood during the normal parturient state. In four cases guanidine bases were searched for, but none was demonstrated. The blood in milk fever was found to be non-poisonous for rabbits, even when large amounts were given subcutaneously (40 c.c.).

The blood sugar findings were very variable. In eight cases sugar was increased in amount; in seven or eight it was normal, and in one or two it was diminished. Lactose was present in considerable amounts only after inflation of the udder.

Sjollema believes that hypoglycæmia cannot be regarded as associated with the cause of milk fever, and that the recorded cases in which glucose injections are said to have cured milk fever can only be explained on the ground that the injections have some indirect action. They cannot be of benefit by their increasing the glucose of the blood.

In three cases examined inflation of the udder caused a pronounced rise in the blood calcium. As the calcium rises, so the symptoms of milk fever disappear.

The inorganic phosphorus was also somewhat raised by inflation.

The slow intravenous injection of 35 to 40 grms. of calcium chloride dissolved in 400 c.c. water is followed by a quick recovery. Twenty cases have been completely cured in this manner. Benefit was also derived with smaller doses (25 to 30 grms.), but with this dose relapse occurred on six occasions.

In one case the cow appeared to recover within a few minutes after the injection of parathyroid extract (Collip). The improvement was maintained for some hours, after which relapse occurred.

Sjollema observes that parturition is associated with great calcium mobilisation, and believes that in milk fever the parathyroid glands have failed to cope with the demands made upon them, and thus a blood calcium deficiency results. W. P. B.

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**[Observations on Artificial Infestation of Sheep with Fasciola hepatica, and on a Phase in the Development of the Parasite.** MONTGOMERIE, R. F. *Jour. Helminthology*, vol. vi, No. 3. September, 1928. pp. 167-174].

By the close of the winter of 1925-26, the author's investigations into the value of certain drugs in the treatment and control of liver rot of sheep had reached a stage when it was felt that further advancement in certain important directions necessitated the employment of sheep subjects which had become infested with *Fasciola hepatica* to a known degree at a particular time. Naturally infested sheep were unsuitable, since observation had demonstrated a great variation—as regards both extent and type—in the infestation of sheep of the same flock.

It was decided to attempt artificially to infest suitable hosts. Preliminary experiments having indicated suitable general lines of procedure, the observations made during the winter seasons 1926-27 and 1927-28 are here placed on record.

Advantage was taken of this opportunity to study to some extent the development of *F. hepatica* within the host. So far as the author is aware no accurate information regarding the time which elapses between the ingestion of cercarial cysts and the appearance of ova in the fæces of sheep is available. This point is of considerable practical importance and observations are noted regarding it.

The collection and identification of the cercarial cysts and their administration to the sheep is detailed.

The successful artificial infestation of 32 sheep with *F. hepatica* is recorded.

Following the administration of 2,550 cercarial cysts to thirty-two sheep, 954 liver flukes were recovered on *post-mortem* examination—37.4 per cent. of the cysts developed. The smallest infestation produced was 8 per cent. (eight flukes from a sheep given 100 cercariæ) and the heaviest 76 per cent. (nineteen flukes from a sheep given 25 cysts).

From forty-four sheep of the same general flock grazing throughout with the experimental animals fifteen flukes, 0.3 per head, were recovered. Five flukes were found in each of two, two in one and a single fluke in each of the other three controls found infested.

The parasites recovered from each experimental sheep were not uniform in size, and the stage of development reached varied much.

Ova of the liver fluke were first found, in numbers sufficiently large to estimate, in the fæces of experimental sheep :—

in 3 cases 10 weeks after infestation,
in 16 cases 11 weeks after infestation,
in 2 cases 12 weeks after infestation,
in 3 cases 13 weeks after infestation, and
in 4 cases 14 weeks after infestation.

Eggs were only detected in the fæces of two sheep at their final, twelfth week, examination. Two sheep were not passing eggs in numbers sufficiently large to estimate even fourteen weeks after infestation.

The author draws the following conclusions from his experimentation :—

"It appears easily practicable to infest sheep artificially with *Fasciola hepatica*, and thus obtain subjects eminently suitable for the study of liver rot and of the value of therapeutic measures in its treatment and control.

"The extent of infestation following the administration of a known number of cercarial cysts varies within quite wide limits. A number of sheep must therefore be employed for experimentation, and as infested controls, before conclusions can be drawn from any set of observations.

"There may be many factors which influence the chance these minute forms have of reaching the intestine of a suitable host in an infective condition. Thereafter the larval fluke is exposed to many dangers before it reaches the liver and, finally, the bile ducts. The writer hopes to study the effect of drying, frost, etc., on the vitality of the cercarial cyst during the coming season. Some of the observations recorded suggest that a larger proportion of the cysts develop when the number given is small. Thus, under natural conditions, when the host may pick up a small number of cysts almost daily, a proportionately heavier infestation may result.

"That the rate of growth and development of flukes following the simultaneous ingestion of a number of cysts varies much, is of significance. It may result in flukes picked up at the same time becoming assailable by drugs at varying periods. These variations may possibly be accounted for by variations in the time spent by the larval flukes in wandering in search of the liver.

"Sheep may commence to pass ova ten weeks after infestation, more commonly about the eleventh week, or not even after fourteen weeks. This variation appears to confirm the observation that the rate of development of individual parasites is not constant, but may also be related to the extent of infestation and other factors. The observation is of considerable practical importance, since it aids decision as to the times at which sheep should be treated in any effort to control the ravages of liver rot by the destruction of flukes as they mature."

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**[Carbon tetrachloride in Liver Rot of Sheep: The Stage at which the Fluke is assailable by the Drug, and the Bearing thereon of Dosage.** MONTGOMERIE, R. F. *Jour. Comp. Path. and Therap.* Vol. xli. Part 3. September, 1928. 191-198].

The author has already recorded * observations demonstrating the high anthelmintic value carbon tetrachloride possesses towards the common liver fluke (*Fasciola hepatica*), a single dose of 1 c.c. destroying all mature and almost mature flukes infesting sheep.

The investigations here reported form part of an extensive study planned to determine accurately that stage of development at which the liver fluke becomes assailable by dosage with 1 c.c. of carbon tetrachloride and also to ascertain whether larger doses would be effective against immature flukes. In this article studies on the effect of dosage with 1 c.c. and with 10 c.c. only are detailed. A number of similar observations using 3 c.c. and 5 c.c. have been made, but since these are being continued with larger numbers of sheep the publication of details regarding them is postponed.

It was found that when the period since infestation was eight weeks or less dosage with 1 c.c. of carbon tetrachloride destroyed few, if any, of the parasites. After the lapse of nine weeks a proportion of the flukes had reached an assailable stage of development and almost all were destroyed at the tenth and eleventh week.

The assailable age of the liver fluke varied with the dose of carbon tetrachloride given. It became progressively less and less as the quantity of the drug was increased.

Dosage with 10 c.c. killed some of the parasites when only four weeks had elapsed since infestation, and almost all when that period was five, six, seven or eight weeks.

Sheep infested with parasites too immature to be killed by the dose commenced to pass ova as early as two weeks after dosage with 1 c.c. of the drug, but not until at least four weeks had elapsed when 10 c.c. was administered.

Except in the case of two groups of sheep dosed with 10 c.c., dosage was well tolerated by the subjects of these experiments. Each sheep of these two groups showed some toxic symptoms and one member of each died under circumstances very suggestive of carbon tetrachloride poisoning. It is emphasised that the sheep used in these trials were small Welsh Mountain wether lambs, from eight to ten months old and varying from 50 to 70 lbs. in live weight, and that fifty of them received 10 c.c. of carbon tetrachloride.

Mr. Montgomerie discusses his results as follows :—

"During the past winter, which followed a wet summer and autumn when much infestation took place, liver rot has been satisfactorily controlled in many thousands of flocks in these Islands by periodic dosage with 1 c.c. of carbon tetrachloride. A proportion of the flukes infesting many of these sheep must have been too immature to be assailed by this administration. These experiments suggest that even more excellent results would have been obtained had a larger dose been employed.

"Since dosage with 5 c.c. appears to destroy the fluke relatively soon after it gains entrance to the animal body, and 5 c.c. being the contents of a single suitable capsule, is inexpensive, its periodic administration would seem the most advantageous means of controlling the disease. The writer believes that this dose has an additional advantage in that it would clear at least part of the so commonly concurrent alimentary nematode infestation.

"Until the toxicity of the drug to ruminants is further investigated and better understood it would, however, seem inadvisable to recommend the general employment of doses larger than 1 c.c. in simple attempts to control liver rot by the periodic administration of carbon tetrachloride.

*Montgomerie. *Jour. Comp. Path. and Therap.*, Vol. XXXIX., 1926, pp. 113—131.

"There may be special circumstances, such as difficulty in collecting some mountain flocks and colonial range sheep for periodic dosage, which would make it advisable to increase the dose employed, and so reduce the number of doses, lengthening the interval between each, necessary for efficient control. In this connection it may be noted that I. Clunies Ross, in a recent booklet issued by the Council for Scientific and Industrial Research of the Commonwealth of Australia, states: 'Do not give more than the dose of 1 c.c. (16 drops) since larger doses will not increase the efficiency of the drug and may cause ill effects.' Since the booklet contains no references nor any acknowledgment of the sources from which such information was obtained, the present writer is not aware whether this advice is based upon any observation or is simply an assumption from the experiments of others.

"The writer has recommended that the interval between doses, when the periodic administration of 1 c.c. is used to control the disease, should be approximately one month. This opinion was based upon observations made with naturally infested sheep. It would appear that the interval could, with advantage, be reduced by one or even two weeks.

"In the treatment of sub-acute outbreaks, in which the majority of the parasites have gained entrance to the animal body some seven to nine weeks before diagnosis, dosage with 5 c.c. should be employed.

"During epidemic seasons several outbreaks of acute liver rot in which the great majority of the flukes were so immature that the various modes of treatment adopted were of little avail, have occurred in North Wales. In these, dosage with 10 c.c. of carbon tetrachloride is likely to be attended by better results. It was employed in the treatment of a most acute outbreak during the past winter. The sheep tolerated dosage well and made a good recovery to produce a satisfactory crop of lambs."

# NOTES AND NEWS.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

## Diary of Events.

Dec. 17th—Meeting of the Editorial Committee N.V.M.A., 10 Gray's Inn Square, W.C.1, at 4-30 p.m.

Dec. 18th—Annual Meeting of the Dumfries and Galloway Division, Dumfries.

### Personal.

*Serious Hunting Accident to Mrs. Male.* Their very wide circle of friends numbered among our readers will learn with the deepest regret that Mrs. Male, wife of Mr. G. P. Male, M.R.C.V.S., of Reading, is lying seriously injured as a result of an accident sustained while hunting with the South Oxon Drag, of which Mr. Male is Master and Huntsman.

The accident occurred on Saturday afternoon last, and it appears that her horse slipped in taking off, giving Mrs. Male a very bad fall. Her right shoulder was both fractured and dislocated, and her left wrist broken, while one rib was also fractured. Latest information enables us to accompany our expression of sincere sympathy with Mr. and Mrs. Male, with the welcome news that Mrs. Male is making as satisfactory progress as can be expected.

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"*An ill wind.*" We regret to learn, too, that Mr. Henry Taylor, F.R.C.V.S., of Hayward's Heath, is laid up with a broken ankle. This invalid has utilised his enforced leisure for the benefit of *Record* readers, having forwarded a batch of interesting "Clinicals" which will shortly appear in our columns. The news of Mr. Taylor's misfortune was told in a typically cheery note, sent with the clinical articles, and commencing: "It's an ill wind that bears nobody any good." Other temporarily incapacitated practitioners please copy.

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*Appointments.*—The Senate of the University of London have appointed the following to act as Examiners for the Intermediate and Final Examinations in Veterinary Science for Internal and External Students in 1929:—

*Veterinary Anatomy.*—J. McCunn (R. Vet. Coll.) (Chairman); and the External Examiner.

*Veterinary Physiology.*—W. L. Symes (St. Thos. H.M.S. and R. Vet. Coll.) (Chairman); and the External Examiner.

*Veterinary Hygiene.*—G. H. Wooldridge (R. Vet. Coll.) (Chairman); and the External Examiner.

*Veterinary Pathology.*—T. Hare (Chairman); and the External Examiner.

Dr. J. Brand, F.R.C.V.S., who retired some little time ago from the position of divisional inspector of the Board of Agriculture, has been appointed as honorary veterinary officer at the Zoological Gardens, Clifton.

Mr. G. N. A. Hall, M.R.C.V.S. (Veterinary Pathologist, Uganda) has been appointed to a similar post in Nigeria.

### Army Veterinary Service.

*Movements of Officers.*

Major H. Bone, M.C., having been permitted to exchange places on the roster for foreign service with Major J. S. Nimmo, D.S.O., has been placed under orders for a tour of service in India, and will proceed on or after 16th February, 1929.

Captain J. Leigh, who is due to arrive home from India on the 15th December, 1928, has been posted to Aldershot for duty in that Command.

*India's Veterinary Chief.*

Brigadier F. W. Hunt, C.B., C.M.G., C.B.E., is vacating the appointment of Director of Veterinary Services at Army Headquarters in India, which he has held since May 24, 1925. His work in the field in the care and treatment of horses and administration of veterinary services has been extensive and of great value, ranging from the Tochi Valley operations, relief of Kimberley, the action at Paardeberg, advance to Pretoria, Somaliland campaign, and as a veterinary chief in France and Mesopotamia. He was on General Sir Alexander Godley's staff at Salisbury before his selection for the veterinary charge of India.—*The Times.*

*Erratum.*—Mr. W. A. Pool, Director of the Animal Diseases Research Institute at Moredun, asks us to insert the following correction in the extract given in our issue of the 8th inst. of his address to the Kelso and District Agricultural Society. The word "not" should be inserted in the sentence beginning in the seventh line, p. 1058, so that it reads:—"It was *not* supposed to deal with work which ordinarily lay within the sphere of the practising veterinary surgeon."

# CORRESPONDENCE.

**Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.**

**All correspondence must bear the name and address of the contributor for publication.**

**The Editor does not hold himself responsible for the opinions of his correspondents**

## The Etiology of Milk Fever.

To the Editor of The Veterinary Record.

Sir,—I have read the paper entitled "Further Studies in the Etiology of Milk Fever," by Professor Dryerre and Professor Greig, published in your issue of the 8th September last, with very great interest. I find myself entirely in agreement with Professor Dryerre when he says that "it would be premature to claim that the precise nature of milk fever was now known."

It would appear that the investigations of the authors have definitely established that there is a lowered calcium content of the serum in milk fever, and their findings have been confirmed by Little and Wright and Hayden and Fish. But whilst this marks an interesting advancement in our knowledge, there still remains considerable doubt that the etiology can be attributed solely to this fact.

Dr. G. H. Percival, Ph.D., M.R.C.P., Pharmacological Laboratory, University of Edinburgh, in a paper read at the meeting of the British Medical Association in 1927, says: "Animal experiments have demonstrated the fairly frequent occurrence of a negative calcium balance during pregnancy and lactation." The same authority has stated that it is only when the serum calcium has been reduced to from 60 per cent. to 70 per cent. of its normal value that any symptoms which can be attributed to such a diminution make their appearance.

If comparisons can be made in veterinary science (the serum calcium is practically a constant and approximately the same) then an allowance can be made for a 30 per cent. to 40 per cent. diminution without the appearance of symptoms. The average figure of 5.18 mgrms. per cent. in the milk fever cases is 47.5 per cent. below the average figure of 9.85 mgrms. per cent. in the normal parturient animals, and yet the most urgent and alarming symptoms make their appearance. And in serums I have had examined in connection with eclampsia, the minimum normal has been as low as 7 mgrms. per cent.

One of the characteristic symptoms of a lowered calcium content in the serum is tetany, but after due regard to the assertions of Professor Dryerre, I am still of the opinion that there is no symptom in the usual course of milk fever that could be mistaken for tetany. It is exceedingly difficult to co-relate the latter with the comatose condition of milk fever.

I can appreciate fully the difficulties confronting the authors, but it is a matter for regret that evidence was not produced of the use of calcium salts intravenously or of the use of the parathyroid hormone.

I am glad to believe that the injection of glucose intravenously also has the effect of raising the serum calcium and this has been tried, but I am not aware of the general successful treatment of milk fever by intravenous glucose, with the entire absence of udder inflation.

Hayden and Fish have logically put the position "Whether a hypocalcæmia can explain all of the symptoms of milk fever is problematical and remains to be determined." The same authorities believe that a complex series of phenomena are indicated in milk fever.—Yours faithfully,

C. V. Dayus, M.R.C.V.S.

Hamilton,
New Zealand.
*November 1st*, 1928.

## Swine Fever.

To the Editor of The Veterinary Record.

Sir,—In my opinion, the best book that has ever been written on the Diseases of Swine ("*Krankheiten des Schweines*") is that by K. Glässer, Doctor of Veterinary Medicine, and published by Schafer of Hannover. He writes: "The cause of swine fever is a filtrable virus. Bacteriological findings are not of much moment, as quite a number of bacteria may influence the course of the disease." As regards diagnosis, he lays stress on diarrhœa and skin lesions, exanthema, pock-like eruptions and multiple hæmorrhages and if, on *post-mortem*, hæmorrhagic or croupous gastro-enteritis is present, swine fever may be declared. It is often observed that outbreaks show a secondary invasion of the lungs (*Schweineseuche*). In single cases, where diagnosis is perhaps impossible, a conclusion can be arrived at by inoculating a test pigling with a few c.c. of blood or blood filtrate.

Glässer states that the changes in the digestive apparatus of the affected pigs are localised in the large intestine, fewer in stomach, small intestine, cavity of the mouth and on the throat. The stomach and intestinal changes occur in five principal forms—(*a*) a serous catarrh of the stomach and intestine; (*b*) a hæmorrhagic catarrh or hæmorrhagic inflammation of the stomach and intestine; (*c*) a fibrinous form; (*d*) a croupous form ("the button" phase); (*e*) a diphtheritic gastro-enteritis. Other changes seen are those in the skin and connective tissue, in the lungs (chiefly caused by the secondary invader *Bacillus suisepticus*), but may be from diplococci, streptococci or organisms of the typhus coli family in the serous membranes (pleuritis and pericarditis), in the spleen and lymph glands (hyperæmia and necrosis of spleen; lymph glands swollen, inflamed and may be deep brown or bluish red in colour). Cloudy swelling may be present in heart, liver, kidneys and muscles of the body and sometimes plain multiple hæmorrhages may be seen on the kidneys (turkey egg spotting).

*Differential diagnosis* includes (1) anthrax; (2) swine erysipelas; (3) *schweineseuche*; (4) typhus and paratyphus of swine; (5) scour of piglings; (6) diphtheria of young pigs (necrotic patches on the lips, tongue and mucous membrane of the cheeks); (7) swine pox; (8) enteritis due to strongylides; (9) retention props in the depressions in the mucous membrane, especially at the ileo-cæcal valve; (10) acute poisonings.

With all these things before us, it seems evident to me that the diagnosis of swine fever in the field, if quick action must be taken, is bound to be a somewhat rough and ready one, with an almost boundless field open for differences of opinion.—G. Mayall, M.R.C.V.S.

## The R.A.V.C. Old Comrades' Dinner.

To the Editor of The Veterinary Record.

Sir,—I would like to express my feelings and those of other Old Comrades of the R.A.V.C.

I attended the last dinner of the Old Comrades' Association, to exchange greetings with old friends of War days and chat over the times when we worked and played together, but found to my dismay that the event was utilised as a means of advertising subject matter which was foreign to such a festive occasion.

May I, therefore, express the hope that on future occasions the dinner will not be taken advantage of as an excuse for long orations on such matters as Veterinary College propaganda and politics of the veterinary profession, which fail hopelessly to be of interest to the majority of those present.—Yours faithfully, H. E. Irwin, Major, late R.A.V.C.

Dutch Cottage,
Morghew,
Tenterden, Kent.

*The Editor acknowledges the receipt of the following:*—

Report of a meeting of the North Midland Division, N.V.M.A., from Mr. J. S. Lloyd, Hon. Secretary.

Report of a meeting of the Midland Counties' Division, N.V.M.A., from Mr. H. J. Dawes, Hon. Secretary.

Communications from Dr. O. Charnock Bradley (Edinburgh), Messrs. P. J. Howard (Ennis), G. P. Male (Reading), A. D. McEwen (London), Major-General Sir John Moore (London), Messrs. H. L. Roberts (Ipswich), A. M. Trotter (Glasgow), and J. F. D. Tutt (Winchester), Lieut.-Col. T. D. Young (London).